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CALIFORNIA.

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SIX MONTHS

IN

CALIFORNIA.

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BY

J. G. PLAYER-FROWD.

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SIX MONTHS IN CALIFORNIA.

INTRODUCTION.

BEFORE the completion of the railroad from the Atlantic to the Pacific Oceans, the countries lying west of the Rocky Mountains were *terra incognita*, or at best only known to those few whom the love of adventure and gain had drawn to those distant lands. California especially, being the most celebrated, had been the most misrepresented. By the majority the land was regarded as teeming with gold and abounding in iniquity; a paradise for paupers, and a refuge for the scum of the earth. To a certain extent this was true. Labour was very well paid, the profits of business were very large, gold abounded in the mines, and poverty springing from want of work was unknown. Flush times naturally induced lavishness in the style of living, and prodigality led to intemperance; but, to-day, San Francisco is as orderly a city as any in the Union,—certainly more so than New York.

The number of travellers attracted to California during the last year has been very great, and I anticipate a large increase for the year to come. My visit to that country has been so interesting, and attended with so much pleasure, that I have been induced to publish a slight sketch of my experiences, not only as a guide to the traveller,

but also as an inducement to those uncertain where to go, to enjoy the trip from ocean to ocean, and the wondrously beautiful country they will find at the extreme western end of the line.

I have not sought to be abstruse, nor have I designed to enter into profound dissertations. My idea has been to give a popular narrative of my excursion to the Far West, in the same way that one would describe a painting that he has seen and admired to a circle of his acquaintance. Those who have been accustomed to the monotony and conventionalities of European travel, will find an immense relief and sense of freedom when roaming amongst the Sierras of California; and it cannot but be interesting to visit a state that, less than a quarter of a century since, was hardly known by name, and to-day takes her place as one of the powers of the American Continent.

I hardly need detail the trip across the Atlantic. One voyage is so like another, and, taken in the aggregate, one set of passengers resembles another so very much, that the experience of one answers for all. There was the usual aristocratic set, who sat at the captain's table and herded together in the daytime; the man of business continually passing between the Old World and the New; the mysterious passenger who appeared to be chased by a destiny; the lady who made her appearance four days after we had sailed, and who was saluted as a new acquaintance; in short, the various compounds and contrasts that make up the little world of an ocean-going steamer. For the first three days it blew almost a gale of wind, but after that time we had a week of the most lovely weather possible, and our days, nay even a great part of our nights, were spent upon deck. Nevertheless, we were not sorry when our captain said at lunch, 'We shall sight Sandy Hook in about an hour's time.' As may be

expected, everyone, with the exception of the old stagers who went to their cabins to pack up, was on deck, all straining their eyes through marine glasses in one direction. Sandy Hook passed, we entered what is called the North River.

As soon as the custom-house authorities had been disposed of, I drove to the Fifth Avenue Hotel, and, having made myself comfortable, took a carriage to survey the city. The first thing that strikes a stranger in New York is the symmetry of the buildings and the evidences of great wealth, especially in that quarter of the town in which my hotel is situated—the houses being either built of what is there called brown stone, or else of brick cased with marble. For my part I prefer the solid honesty of the former. The more costly in appearance has but the semblance of a marble palace, for the exterior is but slabs of marble, and not the solid blocks that their form would imply. Another remarkable thing about New York is the glaring newness that prevails everywhere. The houses, the shops, the very pavement, look as though they had been all made by contract and finished within the hour.

Being anxious to visit California before the heat commenced, I lost no time in setting out for the 'States' and Canada, and a most interesting and instructive tour I found it. But travellers that have preceded me have so ably written on the above countries, that a repetition would only fatigue my readers. I will at once endeavour to interest those to whom the unsurpassed scenery of the Sierra Nevada is yet new, by entering on a description of my journey to the Far West.

Painfully, and with much winding, we scale the Sierras. At Truckee I bade adieu for a while to the Central Pacific Railroad, and took a carriage for Lake Tahoe, about twelve miles from the line. A lovely drive, not

withstanding the dust, with the great pine groves clothing the mountain sides, and broad wastes of snow that could be seen high up through openings in the forest, and great patches of wild flowers, some of them loading the air with perfume, and mountain rivulets, fed with melted snow, leaping instinct with life to the plains below, and the air so pure and nature so lovely, one could not but feel the influence for good that such scenery engenders. And yet there was a sense of oppressiveness in the awful silence that reigned around. Not a sound of life except the hoof-beats of the horses and the crunching of the wheels of my conveyance as we proceeded through the sand of the mountain road.

Be it understood, most civilised reader, that the word 'road' must not suggest to your imagination anything macadamised, fenced, turnpiked, or subject to any of the impositions or conveniences of the king's highway. No country seat with its well-ordered park, no half-way house with good accommodation for man and beast, grace its borders. It is a track leading from one point to another, variable at the will of the driver, and its course depending somewhat on the season of the year. During the dry months the bottoms of the comparatively level mountain gorges are followed, and your carriage winds its way amongst white water-washed sand drifts and huge boulders; but when the melted snows come rushing down the ravines, the trail seeks the higher ground, and digs its way along a wheel-worn shelf on the side of the hills. In fact, the whole country is open to the traveller to choose his way; and the safest plan for the stranger is to follow what are termed 'cattle tracks,' if they lead in the direction he would go. The half wild cattle have an Indian instinct for the best and easiest path along the mountains, and, however tortuous their trail may appear, depend upon it the grade offers the

greatest facility, and the traveller will arrive sooner at his destination than by any other and apparently shorter path.

By the advice of my host I had started at daybreak, and, as we drove along in the silence, I thought that I had never seen anything more beautiful. The summits of the Sierras, or at least such of them as I could see at intervals through the great pine trees, which, on my setting out, had looked like phantom mountains, so shadowy and pale were they in the grey morn, became flushed with the rising sun. It was not exactly rose colour, so much as a warm tint of light, a sense of brightness suffusing all around and penetrating even into the gloom of the forest. At the same time the forest was dark by contrast. And then arose a strange moaning, which swept over the tops of the great pine trees. It was the morning breeze coming down from the great snow-clad peaks as a salutation to the sun; and the brightness came down the mountain sides, and suddenly we were bathed in the sunshine. I got out of my carriage and walked among the trees on a most aromatic surface of dead pine leaves, soft and springy, the contributions of centuries. Here and there one comes upon a fallen tree, the stem of which has probably been burnt by some traveller for his night's fire; but in general they stand straight as steeples, rigid as monuments, with only the gentle murmur of their upper branches as the early wind kisses them as it passes. Below all is the stillness of death.

An opening in the trees, a turn in the road, and Lake Tahoe is before me. Not a ripple on its surface. Surrounded on every side by snow-clad hills, whose sides are covered with pine forests, all of which are reflected as in a mirror, it looks like a painted lake. There is a sense of mystery in its unfathomable depths, a feeling of awe

at this volume of water suspended six thousand feet in the air, never varying in its height, never frozen over like neighbouring lakes, of such rarefied nature that wood sinks in it and man cannot swim in it, the crater of an extinct volcano, fire substituted by water, fed by the everlasting snows, and. full of great fish, bred heaven only knows how, I look upon Lake Tahoe as one of the most striking objects in Californian scenery. I should hardly say Californian, for the boundary line between that State and Nevada runs through the lake. The name of this beautiful mountain sheet of water was formerly Lake Bigler, when a man of that name was governor of the state, but, alas for popularity! his party, which was democratic, went out of power, and his successors gave the lake the original Indian name of Tahoe.

Utilitarianism has even invaded this the heart of the Sierra Nevada. A project is on foot to bring the water of Lake Tahoe into San Francisco, two hundred and sixty miles off. A remarkably enterprising engineer, named Von Schmidt, who has already brought the present supply of water to that city, finding that it was not sufficient in view of the rapidly increasing population, cast his eyes to this distant but unfailing reservoir, and determined to bring it to the borders of the Pacific, distributing its waters to the different mining camps and towns in its passage to the sea. The river Truckee flows into and out of the lake, giving two hundred millions of gallons per diem.

But that was not all. A tunnel some five miles long was necessary, and the fertile brain of the engineer cast about for the cheapest way of making it. He went over to the Central Pacific. He saw that, by bringing their line through his tunnel, the company would save eight miles in distance and one thousand feet in elevation, and dispense with twenty miles of snow sheds, which is more

important still. He proposed to the company to make the tunnel jointly with himself; they acceded, and already the diamond drills are on their way to the scene of operations. When this project is completed, nay almost from its very source, its usefulness will be felt. Thousands of mining claims high up in the mountains cannot be worked for want of water. The canal will pay almost along every mile of its course; and the surplus water, after being used for mining, will irrigate the gardens and ranches that supply the wants of the miners.

There are two or three smaller lakes connected with Lake Tahoe, forming a chain unsurpassed in beauty, and a little steamer plies over its calm surface, landing picnic parties at different points, and taking them up again in the evening back to the hotel. The old stage road to Virginia city skirted the borders of the lake, but the rail has done away with that mode of travelling.

I left Lake Tahoe and its comfortable inn with regret. One could spend a month there most delightfully. The most picturesque scenery; excursions in all directions; shooting, from grizzly bear to the mountain quail; lake fishing and river fishing; mining, if that may be called an amusement; in short, the perfect enjoyment of purely natural scenery. Of course the mode of locomotion must be either on foot or on horse-back, and the latter with the Californian saddle. An English saddle is all very well on a smooth road, or when crossing the plains; but when you have to go down ravines or up hills at an angle of forty-five degrees, the high peak fore and aft is not only a comfort but a necessity. I remember the distress of one obstinate Briton, who persisted in retaining his English pigskin. At one time he was clinging for dear life to his horse's mane, at another his horse was being nearly thrown down by all the weight being on his shoulders. And yet the first experience

of a Californian saddle is anything but agreeable. The great wooden stirrups hang far back, the body is bifurcated between two upright wooden saddle-trees or peaks, like those in a dragoon saddle, only nearer to one another. There is no possibility of that easy lounge backward that we can indulge in at home, and, for the first day or two, the stranger finds the native saddle excessively fatiguing. Once, however, see a vaquéro or cow-herd, lasso in hand, in full chase of a wild ox; see him throw the noose over the animal's horns, and notice how his horse, the moment it feels the jerk, plants its forefeet whilst the lariat is wound round the peak of the pommel, and then you will understand the use of a Californian saddle. The girths also are different from ours, and the proper adjustment of the equipment takes a long time to acquire properly. The Mexican saddle differs slightly from the native Californian, each being adapted to the peculiarities of the country; and I have been informed that the saddle in use in the Argentine Provinces differs again from either of these, and for the purpose of hunting or herding cattle is superior. I have often remarked in California that the mules had one girth tightly strapped round the forepart of the belly, and another as much near the hindlegs as possible, and not, as in our system, across the middle. This, especially with pack mules, prevents the load slipping, though to a stranger at first sight it gives the idea of compression, amounting to cruelty; but the animal does not appear to suffer.

Once more in the train, and, during the next fourteen miles, we ascend nearly twelve hundred feet. Two immensely powerful engines perform the arduous task, until at length we reach Summit Station, seven thousand and seventeen feet above the sea, and only two hundred and forty miles from San Francisco. Here we pass through a railroad construction peculiar to the Central Pacific

line, I mean the *snow-sheds.* Let the reader picture to himself a long gallery composed of immensely strong uprights of timber and great joists of pine wood, the whole arched Gothic fashion, with here and there small openings, through which a glorious panorama is seen for an instant as the train roars its way along. Let him fancy these in winter, when the storm-king reigns among the Sierras, when the fierce snow-drifts come like avalanches down the sides of the mountains, and these massive wooden shields groan, and creak, and bend under the weight of the superincumbent snow, as the mighty wind drives it over the roof; and fancy the great, screeching engines, with the line of carriages attached, thundering through all this, and rivalling the roar of the elements outside, and then he will understand the grandeur of peril as well as the might of engineering skill to remedy it. But it is not only the storm element that is to be dreaded in these snow galleries. A burning coal from the engine, a careless watchman, or, worse still, the torch of the incendiary, will easily set fire to the resinous pine timber. The nature of the arched sheds creates a draft, the wind sweeps in as to a furnace, and there is the roaring of great flames until the whole is consumed. Suppose that the fire begins in the centre. The switch-man, only intent upon watching for the coming train, signals 'all right,' in it dashes, and the newspapers chronicle 'awful catastrophe at the snow-sheds.' Much depends upon the nerve of the engineer. On one occasion the express train entered the wooden aisles; on arriving near the end the driver saw that they were on fire. To check the train would be to risk its stopping in the flames. He saw that the fire had only just commenced; he clapped on all the steam he possibly could; he and the stoker wrapped their blankets around their heads, and they dashed through the blinding smoke and flame. It is exceedingly uncomfortable to be

stopped at one of these snow-sheds, as sometimes happens, and to have to wait twelve hours, or more, at the top of the Sierra Nevada, until the damage is repaired, or another train arrives from the other side.

But the summit is passed, and all the rivers and streams flow westward. In six miles we have descended five hundred feet. The pace is awful; but the scenery, fitfully snatched from the mouths of tunnels, or on emerging from deep cuttings, is grand in the extreme. We round Cape Horn, as it is called; we are shown the head waters of the American river, more than two hundred miles from its mouth; we wind our way through the Giant's Gap, through the deep Bloomer Cut; we go across Placer County, El Dorado County, Gold Run, Emigrant Gap, all speaking of the land of promise we were fast approaching. Ever descending the valley of the Sacramento, which, at Auburn, is only thirteen hundred feet high, we at length cross the bridge over the American river, and in three miles more are in Sacramento.

Sacramento is the capital of California. Here, at present, are held the sessions of the legislature; here the Supreme Court has its seat. The town is composed of hotels, lawyers' offices, boarding-houses, and bar-rooms. In the early days of California, Sacramento owed its importance to its being the head of navigation from San Francisco. It is situated at the junction of the American and Sacramento rivers, into the former of which the Feather river empties itself some few miles further up. All the supplies for the northern mines of California were formerly sent, either by steamer or sailing vessel, from San Francisco to Sacramento, whence they were distributed, by immense waggons or on pack mules, all over the interior. Smaller steamers likewise ascended the Feather river as far as Marysville, and the Sacramento as far as Red Bluffs. The principal streets were filled, during the

day, with those immense receptacles for inland freight, the prairie schooners, as they were called, some of them drawn by eight horses. The day was spent in loading them by the different storekeepers, or freight agents for the San Francisco houses, and towards evening they departed with their several cargoes, generally going some four or five miles the first night, in order to be able to turn out their animals to pasture. For slow freight ox-teams were used, which crawled over the surface of the country to the monotonous sound of bells hung round the necks of the cattle. It was a busy scene, towards evening, to see Sacramento pouring forth its varied articles of merchandise to supply the hard-working gold-producer. It was like the post-office at St. Martin's-le-Grand in the palmy days of mail-coaches. Indeed, from Sacramento many very crack stages started daily, with their six horses, driven by Western men, who would go down the mountain roads full gallop, and, unless anything broke, would take you safely a long way up the opposite slope without hardly slackening their speed. The Western stage-driver is *sui generis*. Of iron nerve and rough coarse manners, reckless, and daring, he is yet more to be trusted than a less bold and more cautious driver. The only way to go down those mountain grades is to rush it. The turns in the road are so sharp, and the incline so steep, that to venture timidly is to risk upsetting the coach. Sometimes, at a bend in the road, the leaders' heads, when there are six horses, will almost look into the windows of the stage; but there sits the driver, with one foot firmly pressed on the break, his horses well in hand, taking them round the corners as if he were in an English park, instead of thundering down a narrow road with only two feet between his wheels and the edge of a precipice three or four hundred feet straight down.

To return to Sacramento. Notwithstanding that its

situation was execrable, that the city was annually overflowed, that a levee was built around it at a great expense, which imperfectly kept out the water, it continued, for many years, to be the most prosperous city outside of San Francisco. It was made the state capital in the place of deserted Benicia. Her merchants grew rich; beautiful houses and gardens, where the soil was an exhaustless alluvium, and the rivers irrigated almost to excess; fruits and flowers of wondrous size and beauty—the City of the Plains, as it was called, was a delightful residence. The tropical heat was tempered by the evening breeze, which blew from the Sierras, whose snowy peaks could be seen rearing their heads miles and miles away; but there came a check to this prosperity. In 1861-2 the great flood came. From Shasta Buttes to the bay of San Francisco was a sea of turbid fresh water. The broad tule* marshes, that extend from the base of Monte Diablo to the foot-hills of the Sierras, were all under water. Great islands of these tules, covered with myriads of water snakes, floated out to sea through the Golden Gate. For three days no tide entered the harbour of San Francisco. For three days the waters that descended from the upper country not only filled the bay of San Francisco but struggled successfully against the swell of the great Pacific. During that time no vessel could enter the port, nor could any ship discharge at the submerged wharves. The salt water fish left the bay, even the oysters migrated from their beds.

At length the waters subsided, but a great part of the land in Sacramento Valley was irretrievably ruined. The waters had brought down a fine white sand or silt, partly from the mines, partly by denudation, which covered the fertile soil to the depth of some feet. All the fine gardens surrounding Sacramento were destroyed,

* Bulrush.

as nothing would grow in the barren sand that covered them. It was then determined to raise the entire city six feet, which in most instances was done, although there are places where the work of filling in still goes on.

The railway then came to Sacramento. The Central Pacific Railroad Company was inaugurated at that place. Messrs. Huntington and Crocker were merchants there. Mr. Stanford, the president of the company, was a Sacramento lawyer and governor of the state of California, and at the present moment Sacramento is virtually the terminus. But it has changed the nature of the city. It is no longer the depôt for the northern mines. No more heavily laden teams block up the streets. The train drops the goods at every station as it passes over the line, and the storekeeper of the interior now sends his orders direct to Chicago or San Francisco. Although the nature of the trade of Sacramento is changed, it is still a flourishing town, and the presence of senators, politicians, judges, lawyers, and the thousand and one hangers-on of the legislature or judiciary, tends to increase its importance. Some fine houses belonging to railway magnates are rising up. The capitol, which has been building for the last ten years, is an imposing structure though unfinished. The arrival and departure of trains creates a certain bustle; and the town is prettily laid out with trees planted on each side of many of the streets.

I was amused at noticing the number of idlers (loafers they term them here) who hung about the station and hotels to stare at passengers. And they were the same people every day. Their business in life appeared to be scanning strangers' countenances, or deciphering the names on their luggage. Having seen the last traveller disposed of, they sigh with a sense of relief, as if they had discharged a painful duty, and relapse into a

state of torpor till the next train comes in. This Sisyphus state of existence is much more noticeable in Sacramento than in San Francisco; people are too busy in the latter place, and the inquisitive one would get run down or pushed aside.

There are two ways of going from Sacramento to San Francisco—the one by a somewhat circuitous route by rail, and the other by steamer to Sacramento and along the bay. Not being pressed for time, I chose the latter, and had no reason to regret my choice. We left the wharf on a lovely afternoon at two o'clock. The steamer was very large, with a saloon its entire length, and cabins or state rooms, as they are there called, on each side looking out on the water. The river was high and very muddy, owing to the immense quantity of matter continually pouring into it from the northern mines, more especially since the system of hydraulic sluicing has been generally adopted. The banks of the river are low and lined with white oak, which, however graceful and beautiful in foliage it may be, is of itself useless as timber, and is only felled for firewood. In many places the stream had overflown its banks, and had cut a channel for itself across a bend of the river, making a saving of some miles, so we had the strange spectacle of our steamer quietly leaving the stream, and taking a kind of steeplechase over the country. The river gradually widened until we arrived at Rio Vista, where we took on board hundreds of salmon destined for the San Francisco market. It was the season just then, and great silvery salmon were piled upon the deck in Billingsgate profusion. The fishermen get from two to three pence by the pound from the market dealers. There are many species of salmon in California. One kind is very peculiar, having a snout or projecting upper jaw, giving one the idea that it shovels in the mud for its food. This sort

is the most inferior for eating. Had an excellent dinner on board, and enjoyed some of our finny passengers from Rio Vista very much.

Continuing our voyage through a labyrinth of channels, the Sacramento joins the river San Joaquim, which drains the southern water-shed of California. By reference to a map of the country, it will be seen that the Sierra Nevadas join the coast range of mountains at a point near Mount Shasta, thence forming an arc southwards, until the two ranges again come together at San Bernardino in the lower part of California. Thus it will be seen that these two ranges of mountains, namely, the coast range and the Sierra Nevada, enclose an area five hundred miles in length, by about two hundred in width. Now the whole of the waters that flow from the eastern slope of the former and the western of the latter, find their way into this immense basin, the only outlet of which is the Golden Gate, and the two rivers that act as conduits are the river Sacramento from the north, and the San Joaquim, which drains the southern portion of the state. When this is considered, the great flood before described is easily comprehended.

We now come to some small bays and then steam through a narrow channel, called the Straits of Carquinez. The Indians have a tradition, that an immense lake formerly stretched away inland, the waters of which burst their way into the bay of San Francisco, which again broke into the Pacific by the Golden Gate. It is certainly true that the geological construction of each side of the strait is the same, and it has more the appearance of having been cut by engineering skill than by nature. Fresh water shells are likewise found high up the banks, as well as distinctly defined beaches. Further on we arrive at Mare Island, which is the Sheerness of California. Here are lying some men-of-war and monitors, and there is a dry

dock capable of floating the largest frigates. A beautiful bay succeeded after this. The water was as smooth as glass. On one side towered Monte Diablo, which rises from the plains, an almost perfect pyramid, three thousand eight hundred feet high. On the other side streamed the coast range of mountains with their valleys that extend to the shores of the ocean—valleys literally flowing with milk and honey, where the cornfield and the vineyard alternate, and where countless herds of fat oxen range among the wild oats, which are indigenous to the country, sometimes growing six feet high, but, alas! during a drought, never appearing above the surface. Woe then to the grazier who is far from the mountains. He sees his cattle and sheep lie down to die by thousands, and in one year he may be reduced from wealth to ruin. The valleys of the coast range, however, are the richest in California. Their proximity to the sea ensures a regular supply of moisture, not in the form of rain but of mist, the cause of which will be explained further on.

A curve in the course of the beautiful waters, and we see the sun sinking into the bosom of the broad Pacific, as we gaze through the portals of the Golden Gate.

As the darkness increased the lighthouse on the fort of Alcatraz Island threw its quivering gleam over the surface of the waters. Immediately before us lights were twinkling from ships' masts, and long straight lines of lamps climbed up a conical hill, and small steamers shot across our path like meteors, with their cabins brilliant with light. There was a sound of bells, the shrill whistle of the engine, the rattling of many carriages, the gleam of a red light, and we were gliding along the side of a pier covered with a sea of anxious faces. Hardly had we stopped than the owners of these faces were upon us. They boarded us like pirates, and then arose a Babel of cries, among which I could distinguish as follows: 'Who

wants to go to the Cosmopolitan?' 'Who wants a carriage?' 'Grand hotel, sir?' 'This way for the What Cheer Coach!' 'Carriage, sir?' 'Take you up for a dollar, sir!' 'Want a hand-cart for your luggage, sir?'

It was impossible to resist. I resigned myself to the first runner that captured me. I was stunned and bewildered, and looked upon him as a deliverer. I begged him to take me out of the din, and protect me as far as the Grand Hotel. 'All right, sir.' 'Here, Bill,' to a man who emerged from the confusion of sounds; 'give him your check, sir, and he'll look after your baggage. Come this way.' I stumbled down a gangway following my guide, who elbowed his way through the crowd, and waited, wondering whether I had done wisely in trusting the check for my baggage to a stranger. However, although I was overcharged most egregiously, I got safely to the hotel with all my traps; and having gone through the ceremony of inscribing my name, and subjecting myself to the criticism of a young man with a profusion of shirt-bosom and diamond pin, upon whose decision depended my fate, whether I was to mount one pair of stairs or five, I found myself in a comfortable room not too high, showing me the precise estimate the hotel manager had of me.

At length, I said to myself, I am in San Francisco, the city of which more contradictory reports have reached England than of any other in the world: at one time represented as a place to shun, inhabited by the scum of population; and again, by other writers, as the paradise of the poor man, where wealth could be acquired without capital, and competence without too great a struggle—where rich and poor were regarded alike—where the climate was Italian, and the inhabitants generous, liberal, and orderly. Now I can judge for myself.

SAN FRANCISCO.

FEW cities in the world are more favourably situated, in a commercial point of view, than San Francisco, and she may well lay claim to the proud title of the Queen City of the Pacific. From the Columbia river in the north to Valparaiso in the south, with the somewhat doubtful exception of San Diego, the bay of San Francisco is the only harbour along the whole line of coast. There are ports where vessels can enter and load, or discharge cargo, but no harbour where they can lie in safety for months. The navies of the whole world can find room here. The entrance through the Golden Gate, which is rather more than one mile wide at its narrowest part, is deep and easy of navigation. The bay of San Francisco proper, that is to say, not including San Pablo and Suisun bays, averages eight miles wide, and is fifty miles long. The whole of its eastern shore is lined with ranches, or farms, and villages. The town of Oakland is immediately opposite San Francisco, and is the residence of her wealthy merchants, whose beautiful houses and grounds embellish this city of oaks.

San Francisco itself is built on a sandy peninsula. Nature having endowed it with the advantage of geographical position, refused it the gift of beauty. A range of low sandy dunes stretches from the ocean to the shores of the bay. A few scrub oaks, whose dwarfed and knotted branches all point away from the prevailing west wind, are to be met with at rare intervals. The *Ceonothus*, a species of privet, is the only indigenous shrub that has any pretensions to beauty; and the general view outside

the town is desolate in the extreme. For eight months in the year a stronge breeze, laden with fog, blows in from the Pacific, and clouds of fine sand accompany it in its progress over the peninsula. Nevertheless that which Nature denied, man has conquered for it. The sandy soil contains a large proportion of iron, and only needs continual irrigation to grow any thing. The consequence has been, that, in proportion as the city increased its boundaries, so has it, as one might say, planted out the sand. It is true that the labours of those on the confines are incessantly employed in keeping down the encroachments of the enemy, for one week's neglect will ruin the garden; but they console themselves with the certainty that, ere long, another and extended cordon of combatants will in their turn protect them.

In 1830 a few adobe huts were scattered along the borders of the bay, and two or three times a year small trading vessels entered the port for the purpose of bartering manufactured goods for hides or peltry. This was the signal for a general jollification. It soon became known that a ship had arrived at Yerba Buena, as San Francisco was then called, for there were plenty of Indians in those days, and the skipper encouraged them to spread the news over the inhabited part of that section of the country, which extended from San José south to about Vallejo north. The Spaniards flocked to the town, canoes laden with hides skimmed over the bay; caballeros came galloping in from all parts. There was the owner of leagues of land under some old Mexican grant, with countless herds of cattle, proud of the blood of Old Spain that flowed in his veins, with his silver-mounted saddle and silver buttons down his open. There were the Vaqueros, half-Indian, but the boldest riders in the country. Then the old Padres came to hear the last news from the world from which they were separated by

such an expanse of land and sea. Some few Americans also might be found, who had wandered over the Rocky Mountains across the Sierras, and found their way down the valley of the Sacramento. These, mixed with a score or two of sailors who had deserted their ships, chiefly whalers, and who passed an idle desultory life—sometimes on the water, sometimes on the ranches, and now and then picking up a señorita as a wife and settling on a slice of her father's or brother's broad lands—these, I say, with of course the Indians, composed the crowd that gathered round the arrival from distant lands. Boots and shoes were in the greatest request, made possibly from hides taken out of the country on a previous trip. Printed calicoes and scarfs for the women, and the numberless little nicknacks that cost so little and sell for so much, were exchanged for the more solid and valuable productions of this country. Nor was even gold dust wanting. In 1842, Don Abel Stearns exchanged goods for some ounces of the precious metal obtained from an Indian. The gold was forwarded by this well known old settler, now no more, to Washington; and there is reason to believe that many others also received it in the course of trade. It is true that the actual gold fever, consequent upon gold being found at Fort Sutter only, broke out in the spring of 1848; but there is little doubt that its existence was known to the old Mission Fathers.

Such then was San Francisco in the early days. About 1835 the Hudson's Bay Company founded an agency here, and their representative built a pretty house, with a garden and stream of water flowing through it, in what is now the centre of the city, without a trace left of the running water.

In 1850 the effect of the gold mines was fully felt, and San Francisco became a corporate city. The rush had been immense; the prices of building material, furniture,

and goods of all description were fabulous. The assessed value of real and personal estate for that year was $21,621,214, an inflation that could not possibly continue; consequently the assessed value for 1851 was only $14,016,903, and that in the face of a large immigration. But the tide rolled onwards, and the area of the city gradually increased, until at length the assessments for 1869-70 were, for real estate $69,766,603, and for personal property $44,982,908, making a total of $114,759,511.

In 1860 the population of San Francisco barely reached 70,000. In 1870 the population, after careful research, and in consequence of considerable discussion on the subject, was found to be 172,750 souls, of whom 8,000 are transient; that is to say, that number enters and leaves San Francisco daily; 9,000 are Chinese, and 2,000 are coloured.

It is questionable whether the year 1870 has seen any advance in population over 1869 as the following statistics will tend to prove:—

The excess of arrivals of passengers over departures was, in 1869	24,402
In 1870 it was only	15,079
The sales of real estates in 1869 amounted to .	$29,937,717
,, in 1870 ,, .	$15,630,272
The exports of treasure in 1869 were . .	$37,287,117
,, in 1870 ,, . .	$32,983,140
The sales of mining and other stocks in 1869 were	$69,089,731
,, in 1870 were	$51,186,450

The greater excess of arrivals over departures in the one year, joined to the larger business transactions that took place in the like respective times, leads me to think that San Francisco has rather lost than gained in population for the last three years. In proportion to her loss, however, has been the gain of the interior towns; many of which, owing to the increased facilities afforded by the opening up of railroads, have suddenly sprung up

to be of some importance; but on this subject I shall speak more fully when I come to the system of railroads that interlace California.

The plan of San Francisco was laid out by an Irish engineer called Jasper O'Farrell and an American of the name of Hoadley. At that time nothing but the north side of the town was inhabited. It was the nearest to the Golden Gate. It was the quarter where the wharves were, at which all the ships discharged their cargoes. The warehouses for the storage of goods, such as they were, all clustered together at that corner. These men, to whom was entrusted the arrangement of the streets of a future great city, had no ken to pierce beyond the actual present, and made their plans regardless either of traffic or population. Every street is too narrow, with the exception of those that the exigency of the case caused to be subsequently enlarged; and the consequence has been, that some streets are almost abandoned, others are inconveniently crowded, whilst the principal thoroughfare had to be made nearly double its width by buying the property on one side, and tearing it down to make way for the pavement.

Again, the arrangement of streets running parallel and at right angles to one another was insisted on. This is all very well upon a plane surface, but San Francisco rejoices in beautiful little hills, one of which, Telegraph Hill, is, as its name imports, the beacon of the city. It stands like a sentinel at one corner, and the first good dwelling-houses were built on its sheltered sides. But no advantage was to be taken of the natural undulations of the land, no beautiful terraces were to be laid out, with the streets winding around the hills in gradual approach to their summits, no amphitheatre with its long sweep of dwelling-houses looking over the moving waters. Nothing of the sort; the streets must all go in straight lines from north to south and from east to west; the plan

of the city looked like a check-duster; and that which might have been made as picturesque as Verona was rendered as uninteresting as Mannheim.

The northern and north-western part of San Francisco is bordered on each side by deep water. The steep bluff called Telegraph Hill, before-mentioned, is only adapted for dwelling-houses, and as such was used in the early days. This arbitrary adoption of straight streets drove the property owners into the plains that run southward, or left them the alternative to live perched on a rock, with a precipice in front of their houses made by the grading of the street. Nay, even that poor privilege was at length denied them. They were obliged by enactment to bring their lots to the established grade, as well as to pay *pro ratâ* for what was termed the *improvements* of the streets by cutting away the hill.

This cutting away of Telegraph Hill—this 'whittling,' if I may so term it, of the face of nature—has gone on till now the poor maimed elevation is reduced to a point, like a badly scraped slate-pencil, great quarries and scars all round; streets that arrive from the south and stop abruptly at a wall of rock that neither man nor beast can scale; the prosecution of the work of levelling stopped on account of the enormous expense, which neither the corporation nor the property owners will incur. There it stands, a monument of the folly of attempting to do that at San Francisco which is so successful and convenient at Chicago, and a warning to those who attempt to improve natural scenery.

From the base of Telegraph Hill, and of course having imaginary lines running straight over it, lead in parallel lines the two principal streets of San Francisco, namely, Montgomery and Kearney Streets. The former, at this present time the principal business street, although being rapidly superseded by California Street which crosses it

about midway; the latter being the thoroughfare where the best shops are situated. For years Montgomery Street kept its supremacy over all. The banks, the hotels, the shops, the theatres, the restaurants, the clubs, all lined its sides. Its thoroughfares were crowded; the rents were four times that of houses or buildings in any other street, until at length it fell from its greatness. An important move was decided upon. It was determined to widen Kearney Street its entire length, and thus relieve Montgomery Street of the discomfort of over-crowding. Some two or three millions of dollars had to be expended, so an act of legislature was obtained, and a committee appointed to assess what those whose property was to be taken should receive, and how much those on the other side of the street who derived the benefit should pay; for, be it understood, only one side of the street was pulled down to widen it. In a year's time, after the adjustment was made, the new side of Kearney Street was a line of the finest buildings in the city, the whole laid with wooden blocks and a broad pavement of asphalt. The shops, or stores as they are called here, are as magnificent as in European capitals; they are brilliantly lighted at night, and the whole thoroughfare is crowded in the evening. Montgomery Street was found too narrow, and the northern half of it, that is, from Telegraph Hill to California Street, gradually fell away from its pristine superiority. The shops began to be 'To-Let;' or, if a new tenant came, it was for an inferior *genre* of business which evidently paid less rent. The bankers and property owners struggled as long as they could against the tide of emigration southward; but the majority have gone with the stream, more especially as the lately established joint-stock banks flourish in all the pomp and vanity of plate-glass in the new quartier.

But Montgomery Street, on the other side of California

Street, presents quite a different appearance. Here are the great hotels, as the Occidental, the Lick House, the Cosmopolitan, the Russ House, and the Grand Hotel, all of them covering acres of ground, and around them are clustered some of the best shops in San Francisco. Here are the silversmiths, some of the principal haberdashers, tailors; the traffic being drawn away by its prosperous neighbour, this part of the street is most agreeable to stroll in, especially as the *entrée* to the common hall of the hotels is open to all, and they are always full of people and newspapers from many parts of the world. Here too are the bars, which are quite an American institution, and in some of the hotels fitted up with great expense and luxury; although, as in some steamboats, they sacrifice the machinery to the upholstery, so here occasionally you meet with some where the stuff they give you to drink is not so rich as the goblet that contains it.

California Street, which I have already referred to, is the street of wealth. Here are the large banks and incorporated bodies, the richest merchants and the gaudiest insurance offices, for even here they use the meretricious attraction of florid architecture. Here also is the Exchange, a very handsome building, and the Stock Exchange, which, true to its traditions, is a brawling assemblage in a large room up a court. Here also are the two principal clubs, the Union, composed chiefly of gentlemen in business; the other, the Pacific, of lawyers and professional men. The one is Republican in politics, the other Democratic, with a lingering perfume of Secession about its walls. Higher up the street are the Roman Catholic and Protestant cathedrals; whilst standing aloof from the two, like a schism, is the Independent or Calvinist church. Beyond this the street is steep and sandy, although there are some good houses commanding fine views.

These three are the principal streets of what I will

call old San Francisco. Formerly, when you left them, you found yourself wandering among sandhills, coming upon scattered houses whose prophetic owners were waiting patiently until the city came to them. The city did come at last, the belt of sand that blocked the southern part of the town was removed, and Market Street was opened. This is the finest street, and destined to be the most important in San Francisco. It is ninety feet wide and five miles long, running in a straight line, on a dead level from the water's edge, to a spur of the coast range of mountains. A street railroad runs nearly its entire length. At the end nearest the city magnificent erections are in course of construction, or are already finished, and good houses line at intervals its entire length. The only objection to it are the blasts of wind that pour daily along its wide straight avenue, bringing clouds of dust in their train.

The history of the Market Street Railroad, as it was called, the first street railroad built in San Francisco, and its effects upon property may not be uninteresting as a phase of California fortunes. In 1851 a French merchant, whom I will call Monsieur P., who had, up to that time, not been very fortunate in his business, went to Paris to make arrangements with his creditors. He left San Francisco at the time of its greatest excitement, when building was going on as rapidly as labour and capital would allow—when the harbour was full of ships and the mines full of their sailors—when gold flowed in from the interior, and flooded out eastward—when interest was from six to ten per cent. per month, and the capitalists were literally coining money, for the scarcity of coin caused many of the banks to issue gold pieces of the nominal value of five and ten dollars. Monsieur P. saw the savings of his countrymen invested at home and receiving a yearly interest only equal to that paid monthly

in California. He was a man of extraordinary activity, both mentally and bodily, and published everywhere in France that he was going back to the land of gold, and would invest any moneys entrusted to him, giving dividends at certain periods. The people, especially the middle and lower classes, ever eager to increase their incomes, subscribed to the new scheme; not at first to any great extent; but when, at the end of the year, dividends to the amount of twenty-five per cent. had been paid, the success of the scheme was assured. Those who had hitherto been reluctant were now eager, the timid became bold, and the scoffers the most ardent subscribers. The office in Paris was besieged by crowds of small shopkeepers with their earnings, by the workpeople with their savings, but above all by the demi-monde as well as the monde not even demi, who went into the scheme with all the eagerness of a woman and the persistence of a gambler. So it happened that, in the year of grace 1853, Monsieur P. found himself at the head of between seven and eight millions of dollars, owning some of the finest property in the city, bringing in enormous rents, and also having bought by the acre almost all the unimproved land lying south and southwest of the city. His foresight was remarkable; he knew that San Francisco must stretch out in that direction, his only error being as to the time it would take. I may as well remark, *en passant*, that he had previously offered to buy the whole of Telegraph Hill, provided the city government would allow him to change the streets and lay out that portion of the town according to his fancy. The city refused, and then he saw that the north was doomed, and he began to look southward.

But, like many a great genius, he had gone too far. Notwithstanding the accumulation of his capital, for he had been receiving fifty per cent. and paying only twenty-five per annum, he had overtasked himself. The

dark days of 1856-7 came. Other capital had flowed into the country, and many other buildings had gone up. The ominous words to a landlord, '*To Let*,' began to show themselves too often. Tenants refused any longer to pay the exorbitant rents with which they had been burdened. For the past three years all branches of commerce were overdone, and real estate went down like a shot. The hundreds and hundreds of thousands invested in outside lands brought in nothing but expense; the immense mining ditches, in which Monsieur P. was largely interested, were (I do not mean the pun) a continual drain; litigation for disputed titles to, or obtaining United States patents for, Spanish grants of property, cost enormous sums, so the consequence was there was no dividend. In vain was the state of the matter laid before the depositors; it was no use assuring them that the affairs would more than right themselves; the fact of no dividend, joined to the mistrust of California prevailing all over Europe, created a panic, and they clamoured for their capital. Little by little the fine city property melted away, partly through mortgages, but chiefly by sales, the largest purchaser being the San Francisco agent of a great Parisian banker. All was sacrificed to satisfy the creditors, until at length nothing available was left. Then it was that Monsieur P. did the only thing that lay in his power. To use a Californian phrase, 'he shut down on his liabilities;' that is to say, he refused to pay any more, either principal or interest, until he chose. Everything tangible here was made over to other names, and Monsieur P. sat down with his faith in the future unabated. Naturally, the people on the other side were furious, the more so that, as long as Monsieur P. remained away from France, they were utterly powerless. Commissions were sent out, powers of attorney the most stringent were forwarded, but all to no purpose. Mon-

sieur P., meanwhile, was not wanting money personally. He had been one of the earliest founders of the San Francisco Gas Works, and they were yielding an enormous income, so that he could continue to live in his wonted luxury.

As I said, Market Street was opened; for nearly half its length it ran through immense tracts belonging to Monsieur P., but a waste of sand lay between them and the city. His fertile brain suggested the only way of making them immediately available, and that was by building a railroad. With his usual energy he set to work, interested other energetic men with himself, obtained an act of the legislature, and in a short time a line drawn by steam-power was running through his property. This property increased a thousand-fold, and that which had been bought for two and a half to five dollars an acre, sold for two and three hundred dollars the lot of twenty feet by a hundred. Monsieur P. organised the system of homesteads, whereby, by the payment of a monthly sum, a poor man can acquire a lot. It is true he pays dear for the convenience, but it is a convenience nevertheless. To-day many streets are running parallel with Market Street, all going through the estate, four of them having horse cars. A large town has sprung up and Monsieur P. is again a millionaire. I understand that through his agents he has bought up the greater part of his indebtedness, at a comparatively small percentage, and devotes a large portion of his income to a liquidation of the rest, so that he will soon be free from debt with an immense fortune. He is an exceedingly liberal gentleman, with the finest gallery of paintings in San Francisco.

The whole of the town south of Market Street is one entire plain, in the centre of which rises a large sugar bakery, built by an Englishman of the name of Gordon. He had established a manufactory on a small scale, but

not being satisfied with its working, he made an extended tour in Europe, visiting the various refineries. The managers of all are exceedingly jealous of strangers, so that Mr. G. had great difficulty in obtaining admission, and when in, could not even make a scratch with his pencil. He retained everything in his head, however, till he got to his hotel, when all was written down. In this manner he constructed these large works, which turn out as good sugar as any in the world. The raw material comes almost from just outside the doors of California, namely, the Sandwich Islands and Manilla. An immensely high chimney close by, belching slowly forth a dense yellow smoke that one is convinced is poisonous, belongs to the reducing and smelting works of Messrs. Hewston & Co. They treat the ores and do the assaying for all the great banks, as well as being engaged by the Mint itself.

The California Mint is a mean little building in a dirty little street, but a large handsome edifice is rising up outside the town.

The theatres of San Francisco are very good, considering the youth of the city and its distance from any other. There are only two that can have any pretensions to rank as 'Theatre Royal'—the Californian and the Metropolitan. The first is the most fashionable, but the acoustic arrangements are defective, and the interior is the most extraordinary thing I ever saw. The boxes, that is, the private boxes, are like martlets' nests in the rock, and open on the walls in all directions without the least regard to regularity. Then there is a kind of immense basket or corbeille, that is fastened against the wall; in fact there are two, one on each side of the house; these are called family boxes and hold about twelve. They are generally filled with the *élite* of the society; and when I saw, as I once did, two mothers with their brood of daughters occupying them, and the male scions at

the back, I thought of the 'Old woman who lived in a shoe.' Generally these are filled with a mixed assemblage of proprieties, that gave me an idea of a special jury in their box. The pit and dress circle melt gradually into one another. There is a slight line of demarcation, like the one popularly supposed to be the exclusive property of the town of Berwick-upon-Tweed; but as the price of entry is the same to each, the choice remains with the payer. Generally a man choses one when with ladies, and the other when alone. Above that are strange pigeon holes where humble gentility hears nothing, but exults in semi-worldliness of privacy. In the middle is a sea of gallery. On each side of the proscenium are two immense mirrors, slightly inclining to the audience, and absorbing them all, as it were, in their reflection. The company is excellent, as good a stock company as any in London; and, when a stray star comes over the rail, they get up plays very creditably.

The Metropolitan, although the oldest theatre in San Francisco, is the best constructed; but it is at the wrong end of the town, and only let to wandering troupes. They had good French Opéra Bouffe when I was there; but the theatre was dirty, and looked as though it didn't pay the proprietors, which I believe is the case.

The other theatres are minor, being of the nigger minstrel and melodeon order, where bad jokes, songs and dances, none of them over-refined nor chaste, are nightly retailed to crowds of men. The places are redolent of bad cigars, stale pipes, staler coats, and unwashed mankind.

The Chinese theatre is unique. The dresses are of barbaric splendour, the music is still more barbarous, being discordant even to a sense of pain; the plot is incomprehensible, but the attention of the audience is intense.

The number of churches in San Francisco implies either great devotion, or immense necessity for prayer. In an area of a quarter of a mile square I counted nine churches, all of different denominations or schisms. There was Trinity with its Low Church tenets; St. James, strong in vestments and chaunted service; the synagogue El Emanuel, the new Jewish branch that would fain, for convenience and gain, change the Sabbath to Sunday. It is the most beautifully finished temple inside in this place. Near is the temple of the old Jews. Then Dr. Stone's new church, strong in its Calvinism, built of the English patent artificial stone, and a very pretty church it is, with strange American devices of roof architecture, self-supporting. There are two Swedenborgian tabernacles, and one coloured church as it is called, the tint referring of course to the worshippers. The same prevails to a less extent all over the city. The Catholics, of course, are everywhere and very rich; fat lands have descended to them from the Spaniards and Mexicans; fat revenues flow to them now from the Irish. I think that one reason of the number of churches is this, the richness of the land. There are hardly any poor, numerically speaking, and consequently the ministers of every denomination flocked here. Their congregations subscribed, built them churches, endowed them with annual stipends, and the profession prospered exceedingly. Then was seen the evil of voluntary election by the congregation, for partisanship arose, from partisanship sprang discord and canvassing as at a political strife. Finally, the defeated party marched off with their champion, built him a new church, and the old story began again. Many people are so rich and proud that they can afford the luxury of having a church under their control like a pocket borough. As for the parson, unless he is very superior, he is quite secondary; it is the vestry which

rules the religion and consciences of the congregation, because, like that disciple of old, it holds the bag, and the poor incumbent is dependent on its contents. Take the Swedenborgians for example. There are very few of that sect here, nevertheless there are two chapels, and that only because three or four magnates could not agree upon some mysterious, inscrutable point of doctrine with the minister (who, by the way, formerly kept a beer-shop), so a pretty little wooden structure was run up close by the other, where doubtless Swedenborg is properly interpreted. When the coloured people bought the land for their church, a very rich Secessionist, whose house was immediately opposite, offered them a large premium on their purchase if they would cede the land to him. With an independence amounting to impertinence they refused, whereupon he sold his fine property for less than its value and migrated. I can almost understand it, for the niggers make a most infernal row at their devotions.

A section of the eastern front of the city is almost entirely devoted to iron foundries. It is curious to walk among them and note the various implements and machinery used in gold mining. Here the visitors see ponderous machines for crushing quartz; there again the more delicate amalgamator for thoroughly mixing the pulp or ground quartz with quicksilver. Of this latter the machines are most numerous, and every foundry has the exclusive manufacture of one or more patents for that purpose. So far as I can learn, not one had arrived at the solution of the great problem, How to extract all the gold? First of all, the quartz should be reduced to an impalpable powder, and then thoroughly mixed with the quicksilver. Every one will tell you that he has arrived at that desideratum, but his neighbour will probably tell you the truth about him.

There are other factories in San Francisco, but the

high price of labour forbids the majority of them being carried on successfully. A cotton mill was attempted at Oakland which made a good article of common cloth, but is now closed, as it did not pay. There is, however, an extensive woollen factory which makes the finest and softest blankets I ever saw. These mills were founded by a Scotchman named McLennan, in 1859, on a small scale, and have grown with the city and with the popularity of the goods they produce, until now three hundred horse-power engines, working night and day, are not sufficient to execute all their orders. From four to five hundred hands are employed, more than one-half of whom are white men, women, and boys, the rest Chinamen. Without these latter the mills would come to a stand-still; an argument, I think, against those who cry out against the employment of Mongolian labour; for were these Chinese not working, two or three hundred whites would be thrown out, and a large sum of money, which is weekly paid out as wages to be spent among the shopkeepers, would be diverted to pay for imported goods. I saw some tweeds and plaids quite as good as any Scotch at this establishment, and they knit stockings, waistcoats, &c. there also by machinery. There are about a dozen large breweries here, which make what they call Lager beer, a horrible frothy washy beverage, much liked by the Germans, and also by the lower classes, on account of its being so cheap. The brewers are almost entirely Germans and have all made small fortunes. On the whole there is very little beer drank in comparison with England, and you rarely see it at the dinner table, very unlike China and India. Bitter beer is unknown, and some Bass that I called for one day was sweet, strong, and ropy.

We arrived at length at Omaha, the capital of the state of Nebraska, which is an uninteresting town,

notwithstanding the boasting assertions of George Francis Train, who having bought a tract of land there some years ago, which he prudently recorded in his wife's name, has ever since been asserting that he possesses a second Eden. Here we came across the first real Indians I had ever seen. They were of the tribe of the Pawnees, dirty, frightful, and repulsive—long black hair, small cruel eyes, immensely broad noses, greasy skins, and a general hang-dog look. Where is the red man of the forest, the noble Indian of Fenimore Cooper's novels? It is true that the natives who hang around the railway stations or western settlements are the most degraded of their race; whiskey and indolence follow in the train of civilisation.

SALT LAKE CITY.

On arriving at Ogden, you change trains to proceed to Salt Lake City. The scenery to the city of the Saints is very wild and barren; and no wonder that the Mormons, in choosing this spot, considered themselves safe from any inquisitorial traveller; and how little did Brigham Young think that, in electing this spot as a resting-place for his people, in a few years he should draw down the strong arm of the law, and be forced to obey and observe the rules and restraints of a country he affected to despise! What a shadow has now been cast over the dreams of this arch humbug! How great are the mighty fallen! His hold on his ignorant followers is fast passing away, and in a few years this impostor and his benighted followers will be a thing of the past.

What is termed 'Salt Lake City' is nothing but some few streets of wooden houses, two or three hotels, the tabernacle, and the residence of Brigham Young, remarkable only for the picturesque manner in which the grounds around the residence are laid out.

Being curious to observe how the Mormons concluded their religious services, and happening to be there on the Sabbath, I attended the tabernacle—a very large edifice resembling a gigantic egg in form, the interior very gloomy, with wooden benches; and, in front of the organ, three rows of benches where the apostles sit.

The great feature of this building is the ease with which a very large congregation can make its exit. The organ, a remarkably fine-toned instrument, is the largest in the States.

The sermon was preached by an individual who evidently had received little or no education, and whose principal topic from beginning to end was abuse of every other sect but his own. The 'blessing' was bestowed by John Young, eldest son of Brigham, an oleaginous-looking subject, who seemed to thrive much on the creature comforts of this world.

So many works have been written on the Mormons, particularly by that able writer Hepworth Dixon, that it would be inflicting a thankless office on those who may be led to read these pages. In a short time Salt Lake City will become a very prosperous place, as many mines have been lately discovered. This district bids fair to become the centre of extensive mining operations, and is already drawing the attention of speculators from the Western country.

At Ogden the beautiful scenery begins. We are now 880 miles from San Francisco. The train rushes along by promontory Toano, and stops rather longer than usual at Elko, this being the station whence the stages depart for, or bring passengers from, the famous mining district of White Pine. The White Pine Mines were discovered in 1866, and the following year a rush of miners from all parts of California and Nevada was made to this new Eldorado. Treasure City, as the principal town of the new district was called, sprang up like magic. It mattered not that the transportation of goods and materials for building was exorbitantly high, that the road lay over a treeless desert, that the town was at the top of an almost inaccessible mountain, that there was no water, that the wind generally blew like a hurricane; these were disregarded in view of the fact that the mines were there. The Eberhardt, now the property of an English company, looked down from its peak upon the town. The Hidden Treasure, the Aurora, and a host

of other mines were above, around, and below; and ten thousand people flocked to this inhospitable country. In vain were they warned that it was too early; that the snow covered the ground so thickly that prospecting was a matter of impossibility; everyone thought that the warning arose from an interested motive, and from a desire of the informant to secure the choicest claims. The consequence was, extreme misery and suffering among those who had not money enough to pay the exorbitant charges of the so-called hotels. With the arrival of spring the multitude dispersed all over the mountains, and, as is universally the case, the majority of the prospectors were disappointed. The mines were there, but the expenses of working them were enormous. The ore proved to be more rebellious than was expected; there was a great deal of what is called base metal met with, so that the multitude of fortune hunters melted away like the snow from the mountains. This is the history of all mining excitements in California; and one remarkable circumstance attending such life is this, that men will leave good paying claims, and go hundreds of miles away in the chance of finding something better. It is the passion of gambling engendered by the search for gold. Each man thinks that he is to be the lucky one. Such was the case with White Pine. The Eberhardt Mine was supposed to be worth millions, the ledge or vein with its various spurs and divergencies could be traced in all directions, why should not another claim prove equally rich, and so Treasure Hill was honeycombed, but, as I said before, with disappointment to many.

After leaving Elko we arrive at the Palisades, a most beautiful part of the road, and one which presented immense engineering difficulties. 'The Palisades' is an immense wall of rock, perpendicular in many places, and the train goes winding in and about precipices, by the

sides of cañons through tunnels cut in the solid rock, until at length what is called the top of the Palisades is reached, 575 miles from San Francisco, and at an altitude of 4,800 feet above the level of the sea. The scenery somewhat reminded me of Matlock on a larger scale, but without the luxuriant green that gives the charm to our Derbyshire hills. We have been descending all the time since leaving Independence, and now rush on past Battle Mountain, where the stages connect for Austin the centre of the Humboldt district silver mines, past the sink of the Carson river, which there disappears perhaps to emerge on the other side of the Sierra Nevada; thence, still descending, until White Plains is reached, 3,900 feet above the sea. All this while we have been driving by the force of gravitation, brakes down and engine screaming as it turns the sharp curves. For hours, whenever a bend in the road rendered it practicable, we had seen the summits of the Sierra Nevadas covered with perpetual snow and standing in sharp outline against the sky. Now we found ourselves among the foothills of this range and began to ascend. Reno was the first station of importance that we reached. From this point of the line the stage-road for the mines of Virginia City takes its departure.

I shall have occasion to describe Washoe and the Comstock lode in another portion of this book treating of the mines of California and Nevada.

CALIFORNIA.

I NOW come to the more serious task of describing the Golden State, its climate, geology, zoology, &c., as well as its mining, agricultural, and other industries. I believe that many travellers content themselves with a hurried visit to the wonders and beauties of this distant region; at the same time I cannot but think, that a detail of its resources may prove interesting.

First then the *climate of California*; and, for the purpose of properly comprehending that, the reader must discard from his mind any idea of uniformity of climate and regularity of seasons, such as he is accustomed to witness in Europe.

On looking at a map of California it will be noticed, as I have before observed, that its greatest area is enclosed by the Sierra Nevada mountains on the east and the coast range on the west, and that these ranges unite or nearly so north and south. The extreme length of California from north to south is about 700 miles, extending from latitude 32° 45′ to 42° north, with an average breadth of 180 miles. Now the area enclosed by the ranges of mountains is more than 500 miles in length, and embraces almost the whole wealth, both mineral and agricultural, of the state. Consequently, my remarks will more directly apply to this portion of California, and I beg attention to the following facts before I describe the variety of its climate.

It is known that the currents of air under which the earth passes in its diurnal revolutions, follow the line of

the sun's greatest attraction. These currents of air are drawn towards this line from great distances on each side of it, and as the earth revolves from west to east they blow from north-east and south-east, meeting on, and of course causing a calm at, the line.

Thus when the sun is over the equator in the month of March, these currents of air blow from some distance north of the tropic of Cancer and south of the tropic of Capricorn, in an oblique direction towards this line of the sun's greatest attraction, and form what are known as the NE. and SE. trade winds.

As the earth in its path round the sun gradually brings the line of attraction north in summer, these currents of air are carried with it; so that, about the middle of May, the current from the NE. extends as far as the 38th or 39th degree of north latitude, and by June 20, the period of the sun's greatest inclination, it extends to the northern part of California and the southern section of Oregon.

These north-east winds, in their progress across the continent towards the Pacific Ocean, pass over the snow-capped ridges of the Rocky Mountains and the Sierra Nevada, and are of course deprived of all their moisture by the low temperature of those regions of eternal snow; consequently no moisture can be precipitated from them in the form of dew or rain in a higher temperature than that to which they have been subjected, for necessarily no condensation can by any possibility take place. They therefore pass over the hills and plains of California, where the temperature is very high in summer, in a very dry state; and, so far from being charged with moisture, they absorb, like a sponge, all that the atmosphere and surface of the earth can yield, until both become apparently perfectly dry.

Thus is the dry season produced in California, which continues sometimes until after the sun repasses the

equator in September, when about the middle of November, the climate being relieved from these north-east currents of air, the south-west winds set in from the ocean charged with moisture, the rains commence, and continue to fall at intervals from about the middle of November until the middle of April. I have said from November to April, taking the average rainfall for fifteen years as my guide; but in many instances it rains as early as September and as late as May, although more frequently in September than in October; on the whole, the rainy season may be said to be from November to April inclusive.

Again; there is an extensive ocean current of cold water which flows along the coast of California, from the North Pacific or perhaps Arctic Ocean. I have heard it stated that it flows from the coasts of China and Japan northward to the peninsula of Kamtschatka, and, making a circuit to the eastward, strikes the coast of America in about 41° or 42°. Be that as it may, it does flow along the coast, bearing with it a cold current of air, which appears in the form of fog when it comes in contact with a higher temperature. Indeed off the coast the course of the current can be followed by the bank of fog that hangs over it. This current passes south, and is lost in the tropics.

Towards midday the vast dry surface of the interior becomes greatly heated, causing an undercurrent of cool air to rush about that time from the ocean, bringing with it the dense fog caused by the meeting of the before-mentioned hot dry NE. wind and that accompanying the cold northern current. When the equilibrium is restored the wind ceases. Thus for six months, in San Francisco, there is a warm, sometimes burning, morning; and a cold, windy, drizzly afternoon, followed by a clear starlight night.

This is one phase of California climate in San Francisco. San Francisco may be said to be situated on the western side of the coast range, so that the NE. trades seldom reach the city; but if, as is sometimes the case towards the time of either of the equinoxes, the north wind should come creeping along from the shores of the bay, or the east wind escape through some gorge of the hills, then it is that the San Franciscan experiences what is felt during the greater part of the year in the interior; unaccustomed to the hot, dry, parching air, with neither dress nor house fitted to live in, he goes about panting and complaining; and the newspapers chronicle the hottest day of the season, with the thermometer at the usual rate in Marysville or Sacramento.

This is another and brief phase of San Francisco climate.

The third phase begins about the middle of September. The daily fogs no longer sweep over the city; the wind blows fitfully from all quarters, and not, as for the last six months, uniformly from the west. Frequently in the morning it is easterly, whilst from force of habit apparently it veers to the west in the afternoon. Clouds gather in the south; it is generally cloudy in early morning, contrary to the other season. The air becomes very soft and balmy, the dews lie longer on the ground and the springs of water increase in volume. At length the wind begins to blow in gusts from the south-west laden with moisture, and finally down comes the welcome rain. Everybody is glad; almost everybody is uncomfortable, for they are so little habituated to getting wet. The dust of the streets turns to mud, the dried planking of the pavements swells and starts from its confines, the shrunken roofs leak, workmen are busy making houses tight for the winter, and umbrellas are brought out from their concealment. The greatest number of rainy days the wind is SW. The heaviest rain comes from the SE.

The winter season is the most delightful in San Francisco. It rarely happens that ice forms, or even snow falls. Occasionally snow remains for a few days on the peak of Monte Diablo, or on the coast range on the other side of the bay; but, owing to the proximity of the ocean and the prevailing southerly winds, winter has no terrors, and the fine days, whereof there are many, are most enjoyable. Many families connected with San Francisco go there from New York during the winter to escape their own terrible climate.

In the interior it is very different. From the beginning of May to the end of October, in most years, the sun rises without a cloud and sets without a shade over his disc. During the entire day he blazes overhead; there is not a breath of wind to temper his rays, nor a drop of rain to moisten the parched earth. Near the Sierras a most welcome breeze does come down every evening; such is the case at Sacramento, which is near the mountains; but quite in the interior, as at Marysville or Oroville, Stockton, and Millerton, the only solace is the absence of the sun. This continued dry cloudless weather is very wearying, but, strange to say, the regular inhabitants soon get acclimated, and work at noonday as though in a more temperate clime. This is fortunate, as almost all the mines are in this region. It will be understood that the coast gets the rain earlier than the interior, and the coast range absorbs the rain clouds until it gets so saturated that it can hold them no longer, when they spread over the thirsty interior. At length clouds begin to bank up in the south, and there is a brilliant sunset. That luminary rises with veiled face, and at length the gates of heaven are opened and down comes the rain in sheets. The first rain generally lasts three days at intervals until December or January, when it is of longer duration. Now it is that wet diggings are abandoned and the dry gulches and hill-

side claims are worked. No heed whatever is paid to the driving rain, for the golden opportunity must be seized ere it flies away, so ditches and dams and reservoirs are hastily constructed, and no effort spared to coax the water to remain as long and make itself as useful as possible. This is applicable to the southern and the lower part of the northern mines; but all along the foothills of the Sierras and in the counties of Del Norte and Klamath, Trinity, Shasta, Nevada, Placer, Plumas, Sierra, &c., the ice king reigns supreme; the snow lies from ten to fifteen feet thick, and drifts to great depths, covering the tops of the miners' camps in many instances. Some of the most hardy miners lay in a stock of provisions, keep the snow clear in front of their log-houses, and wait the melting of the snows, which is their golden opportunity; others, perhaps more prosperous, hibernate in the towns, generally in San Francisco.

Spring is the season of gladness for all, unless it has been a dry season, and then every class suffers; but if the earth has been properly soaked and the average rain has fallen, then the streams are full and the Sierra Nevadas have a wealth of moisture stored up in their snows that will not fail until June or July. Then it is that the farmer and the miner are most active, the land is green with pasturage and brilliant with flowers of many hues. Even at the end of the year, if the winter has been propitious, the cattle thrive, for the wild oats that grow above a man's head dry in the hot sun, and afford excellent pasturage, whilst the beasts grow fat on the oil of the ripe seeds of the many grasses and herbs that abound; so that what to a stranger appears a barren waste is sometimes the most nourishing for cattle; but, without the winter's rain, not a blade appears and the animals perish by thousands. Another apparent anomaly is, that the first rains nearly starve the cattle. The moment they

fall, the seeds are loosened from the grasses, drop to the ground, and rot or germinate; the young grass derives no nutrition, and the herds become as lean as skeletons.

The climate of the extreme south of California, such as Los Angeles, San Diego, &c., is semi-tropical; there are no severe winters, though it suffers sometimes from extreme drought, and occasional frosts nip the more tender productions of that part of the country.

A third and intermediate climate is that enjoyed by the narrow strip between the coast range and the Pacific, and that of the different valleys running from the bay to that ocean. I can liken it to nothing better than the climate of Devonshire. The sea fogs that strike the summits of the hills keep the air moist, whilst the reflection of the sun's rays warms it; innumerable streams trickle down to the plains, keeping them always green; and, with the exception of occasional thick and stormy weather, this limited section enjoys the most charming climate of all the state.

The average range of the thermometer in San Francisco is from 50° to 70°, but on extraordinary occasions has fallen from 85° to 46°, and that in twelve hours. This was owing to the violent restoration of the equilibrium, the reasons for which have been already given. When the thermometer at San Francisco is 70° it is 86° at Sacramento and 106° at Millerton, at the head of the valley of the San Joaquim.

One extraordinary fact connected with the rainfall in California is, that whereas the rain comes up from the south, it is invariably first heard of in the north. Thus the inhabitant of San Francisco, when the telegraph informs him that it is raining in Portland, Oregon, or up at Shasta, may look for it in a day or two at his city. Thunderstorms are of very rare occurrence, and lightning only plays its harmless sheet fires occasionally about the horizon, or round the peak of Monte Diablo.

The shortest day of the year at San Francisco is about nine hours and a half from sunrise to sunset, and fourteen and three-quarters is the duration of the longest, but twilight gives about two hours' extra light to each end.

California is subject to mild shocks of earthquakes, which many weak people seem to connect with its climate, and are apt to say on the occurrence of a hot day, 'We are sure to have an earthquake.' Now I have conversed with many well-observant people on the subject, and not one of them had noticed any rise in the temperature of the air, either before or after the occurrence. I should rather conclude, dare I hazard an opinion on a subject so very little understood, that as all the shakes that have happened in the neighbourhood of San Francisco have followed the line of the coast range, their cause may be traced to electro-magnetism rather than atmospheric influences. There have been some sharp shocks in California since its occupation by the Americans, but none so severe as in the time of the Spanish rule, when some of the fine old Mission churches were overthrown; not that I mean to infer that the change of government has changed the Plutonic forces, nor that the American is exempt from the ills that afflicted the Castilian.

The climate of California may be summed up as one of contrast; and now that the railroad shortens distance, you can leave the burning Stockton plains in the morning, and dine amidst the eternal winter of the Sierras on the same day; or leave the orange groves of Los Angeles, and sleep with the bracing air of the Pacific pouring along the Golden Gate through your chamber windows. Her climate is like the fortune of many of her children; one-half of their California life they bask in the full sunshine of prosperity, and the other they battle against the blasts and storms of adversity.

THE GEOLOGY OF CALIFORNIA.

TO TREAT the subject-matter of this chapter in a purely scientific manner would take a volume, and at the same time would require more scientific knowledge and research than I either possess, or have given to the subject. I merely present a slight sketch of the general geological features of the country, a sort of reminiscence of an acquaintance, not the biography of an intimate relation.

To all foreigners the word California signifies *gold*, and, as it was for many years the sole, and still remains the principal, staple commodity, so will my remarks be chiefly directed to that precious metal.

California may be said to possess four great mineral belts. The Copper bearing, the Gravel belt, the Slate belt, and the Granite belt, the three latter are gold bearing, each of them having their respective elevations one above the other. The copper belt is found at a slight elevation above the level of the sea, and ore has been worked in Crescent City in the north; at Grizzly Flat in El Dorado County; in Shasta County; in Nevada County; in Napa County; at Copperopolis, and at San Diego. The only mines, however, that attained any importance were those of Copperopolis, where the famous Union mine is situated; hence its somewhat composite name. The amount of ore exported in 1862 was 3,660 tons; in 1863, 5,553 tons; in 1865, 17,787 tons; in 1866, 19,813 tons; and then prices fell so low in Europe, on account of Australian and Chilian copper, that, in the first half of 1867, only 3,452 tons were shipped, after which

copper mining drooped, and now has entirely ceased. The ore that was exported contained about 14 per cent. of metal on an average. The richer ore, some of it containing a very high per centage of copper, was reduced in California, and preparations were making to erect works at or near Copperopolis, on a very large scale, when the crisis came. Still there are many who foretell the day when copper mining will be a great Californian industry, particularly if, as in some cases, the more precious metals of silver and gold are found in connection with the copper. For example near Sweetland, in Nevada county, the gold is so much mixed with the copper that it is a question whether the mine is a poor gold or a rich copper one. The dust is worth eleven dollars an ounce. Sulphuret of copper, or copper pyrites, is found in almost all the gold-bearing quartz lodes throughout the country, and some fine specimens of malachite have been obtained near Los Angeles.

The auriferous Gravel belt is of much greater importance. It was in it that the first discoveries of gold were made. It was the only one worked for years, and the only one supposed to be worth working. To-day we know that there are two distinct gravel beds in California, the *old* and the *new*; the *new* beds comprising those surface diggings all over the state, whose boulders are rounded and pebbles polished by existing streams, and whose gold has been brought down within a comparatively recent epoch; the *old* exists far below the surface, and has formed the beds of mightier rivers than now flow along the great basin. They tell the story of young earth ere the Sierras were formed, and their water-worn rocks speak of the rolling of mighty waters that have passed away for ever. But of these further on. Let us return to the new gravel belt. This belt, as a general rule, is found on the western slopes of the Sierra Nevada, from two to three thousand feet above the level of the sea; and at this

elevation gold is found almost everywhere. The floods of winter have not only carried it down the gulches, but sown it broadcast over the land. But, before I go any further, let me premise that gold of this nature, 'placer gold,' as it is called, is now generally supposed to have formed part of the mother vein, and to have been disintegrated from it by the action of the elements, or other natural force. This gold, in many instances, is extremely fine, and consequently easily gathered up by clay or mixed with sand; hence it arises that, in almost any part of the Placer district, the 'colour' can be found, though not in sufficient quantity to make the working of it profitable. Deep gullies and ravines seam the faces of the mountains. These gulches cut through the matrix. Their beds are dry in summer, but when the winter rains come, or the snow melts, they are filled with a turbid roaring stream bringing down rocks and trees and all kinds of abrasive matters. The sides of the gulches are torn away, and the whole debris is strewn over the gentler slopes of the hills below. But in these lower ranges exist rivers which cross these diluvial deposits in all directions, and gather the richest of the precious stores so rudely torn from the mountains. Thus arose two separate deposits; the one on the numerous table-lands of the foot-hills, which go by the name of 'Flats,' as Shaw's Flat, Brown's Flat, &c., where the gold is fine and universally diffused; or those of rivers and creeks, where the gold is coarse, and found generally below the gravel, such as the mines of the north fork of the American, the Middle Yuba, Wood's Creek, Mormon Gulch, &c., all famous for their placer wealth. As may be supposed, the flat and river diggings are the easiest to be worked, as well as the numerous gulches running from these table lands. Perhaps the richest creek in all California has been Wood's Creek in Tuolumne county. It is only ten miles long; from the earliest mining

days it has been worked over and over again, and to-day is being still worked with success. The history of mining on this creek, which is the history of mining on every creek in California, will be told under the head of mining. The coarse gold being so much heavier than any other body that was carried along with it, naturally fell into the first cavity whose sides were steep enough to allow it to rest there under the rush of waters, eventually being covered over with lighter stones, sand, and mud, so that, on the subsidence of the waters, all that had to be done was to remove the upper diluvium and arrive at the precious metal.

But these gravel deposits are of various natures. Sometimes they are of many strata one above another, each strata of a different composition from any other, and the whole from fifty to three hundred feet thick, with gold in every one of them. Sometimes they are so strongly cemented with clay as to form a solid conglomerate, and again they are as loose as a sea-beach. Again, auriferous gravel is found mixed with decayed quartz, as though the vein had been brought bodily down and buried, where it gradually rotted. And again, fragments of petrified trees and great boulders are found, with stones of all shapes and sizes, but all water-worn.

The common term for the gold found in these river beds, creeks, and gravel deposits is 'placer gold,' or 'gold dust,' and is both fine and coarse. The different varieties of fine are scale, grain, shot, flour, and wire gold, which speak for themselves. The scale gold is sometimes called float gold, and, from the nature of its formation, is more generally diffused than any other. The wire gold sometimes assumes fantastic, even beautiful forms. I have seen it twisted together like a tangled skein of silk, and at other times standing out of a flat surface like the fronds of moss.

The miners have christened coarse gold after their most familiar objects, such as buckshot, pea, bean, mocassin, cucumber seed, pumpkin seed, and some others, but these are the most common. It is strange how common it is to find gold like the sole of the foot, the mocassin. All those of the form of pea, bean, shot, &c. are gold that has been carried some distance, or been washed by successive floods, whereas the wire and float have but lately been torn from their parents. There is no rule about the *locale* of these various sorts. They may be found together or separately, or side by side, or one shape on one bank of a river and another on the opposite bank. Gold takes strange shapes sometimes, especially in the larger unclassified nuggets. One specimen I saw had precisely the form of a head of maize, or Indian corn, only each grain was crystallised gold. Such specimens are exceedingly rare; indeed, crystals of gold either singly or in groups are scarce. When found the crystal forms an octohedron. When the lump of gold has its edges sharp and rough, look out for the mother lode close by, especially if it be a small gulch. Coarse gold runs in pieces of the value of from half a crown to twenty pounds. Above that amount they become *curios*. The largest nugget found in California weighed one hundred and ninety-five pounds troy, which has been beaten by Australia. One day in the town of Sonora, in the Southern mines, after a very heavy rain and freshet, a man was leading his mule cart up the steep principal street, when his foot struck upon a large stone; he stooped down to remove it, and found it was a solid lump of gold, about twenty-five pounds weight, which had been exposed by the storm, and many hundreds of people had passed over it daily. An amusing circumstance connected with the lucky discovery was that, upon its being made known, the whole of that portion of the town, including

the street, was staked off for mining claims in less than an hour, for miners' law rules pre-eminent. Coarse gold is never found in quartz, although large gold boulders have sometimes a considerable quantity of quartz mixed with them; but why the gold in quartz, which is supposed to have furnished the coarse gold, should itself be so almost infinitesimally fine, has never been determined.

Gold varies in fineness from 500 to 990. The average is 875 to 880. For gold is never found perfectly pure; it is always alloyed with silver, and sometimes with copper and lead. The figure 1000, therefore, is used to denote pure gold; but supposing a specimen or bar contains one-fourth of silver, then it is only 975; and one-half baser metal, then it only ranks as 500 fine. Gold 500 fine fetches proportionably a higher price than gold 990 fine (which has only ten per cent. of base metal), on account of the value of the silver, &c. that goes with it.

As a general rule the gold of the north is finer than the gold of the south of California. In Placer county, for example, the gold ranges from about 860 to 930, whilst Kern river and Mono gold is only about 600, and that of Walker river, high up in the mountains, is only 560. The most uniform richness of gold has been found at Columbia in Tuolumne county; it ranged from 930 to 970. I shall have occasion to speak of this town in connection with mining. The wiry gold is universally poor in quality running in the neighbourhood of 750. A substance valuable in itself yet depreciating gold is often found with it, and that is iridium. In the north especially it is so abundant in some districts, that gold is there worth from a dollar to a dollar and a half less than other dust in consequence. The gold of Mariposa county, although it is perhaps the richest county in the aggregate, on account of gold being diffused all over it, is poor and wiry, and, even when coarse, the quality does not exceed

820. The average is 760. In most cases gold taken from quartz has more alloy than placer gold.

A few words about the old gravel beds which are of comparatively recent discovery. In bygone ages, which may be almost termed pre-scientific, four (at least) great rivers traversed the then portion of the globe now known as California. Their direction was from north-west to south-east; they were from a hundred to five hundred feet wide. Immense rocks obstructed their flow, and huge boulders strewed their bottom. To-day the mountains of the Sierras cover them, and they are only partially exposed where the later rivers and the rents, caused by subterranean forces, have worn deep ravines, or opened wide crevices. Wherever such an occurrence has taken place, the river or ravine has proved to be extremely rich, and portions of the bed of the old river have always been found above the point of intersection. In one river a portion has taken the name of 'The Blue Lead.' It was first discovered in Sierra county, underlying every other strata, and walled in by steep banks of hard bed rock, exactly like the banks of rivers and ravines as we find them existing at the present time. This bed rock is water-worn like that of any other river, and rounded quartz and other pebbles are mixed with the blue clay. Petrified trees and wood are likewise found. As is the case in the rivers of the present day, the fine gold is washed to the banks, whilst the coarse lies in mid stream, or what was mid stream. This river has been traced for more than twenty miles, and the history of its working will appear under the proper head. At present I can only say that, could faith exercise her power and cast the mountains to the bottom of the sea, there would be laid bare an Eldorado which would shame California, and the relics of a past world that would be the delight of geologists. In other parts more particularly, as at pre-

sent known, at or rather below the junction of the north and middle forks of the American river, this subterranean channel has spread out to a large area, which is being rapidly developed by means of shafts being sunk and drift-ways run. Wherever the old bed has been found the prospectors have found gold; it is estimated that there is work enough there for ten thousand men for a hundred years to come, and that every man can get rich on the produce of his labour. Looking at all this, one is irresistibly led to exclaim, Where did the gold come from? And is this underlying strata of stones and clay the lowest of its kind? And where is the mother vein that filled these buried crevices; and whence came this blue pipe clay, even now sometimes found soft, though in most cases indurated as hard as stone under tons of superlying gravel? The elevation that furnished these rounded and polished boulders may have been in the heart of the Rocky Mountains, and the water that flowed over them may have had its source where the streams now run eastward. No one can tell; but mankind here is exceedingly inquisitive in the shape of tunnels and drifts, which, like so many spectrums, pry into the interior and discover the hidden secrets of the earth.

It is very likely that the course of one of these subterranean rivers lies under or near to the town of Sacramento, because on an attempt being made to bore an artesian well for public use at that place, the workmen were obliged to desist on account of arriving at a stratum of boulders which the borers were unable to pass through. At Stockton, however, they were more successful, and, after going down a thousand feet, obtained a flow of water which rose eleven feet above the surface, and yielded sixty thousand gallons of water daily. A like attempt was made in San Francisco, but it was abandoned, although there are two natural artesian springs in the

city, one of them discovered bubbling up below the level of former high water now covered with buildings. The various strata passed through when boring in Stockton were red and blue clay, mica, sand, gravel with traces of gold, this latter at a depth of a hundred feet, green stone, quicksand fifteen feet thick, very coarse sand at a depth of three hundred and forty feet, and here the workmen came upon the stump of a red wood tree besides striking water. All the way down was but a repetition of this one stratum following another, of more or less thickness, and still they ended in sand.. The bore in San Francisco came to an interminable stratum of sandstone; and it was the opinion of geologists, that it would be useless to go deeper, as that formation is often many thousand feet in thickness; nor is it likely that the gravel and boulder beds in the neighbourhood of Sacramento will ever be laid bare, seeing that they are three hundred and fifty feet below the level of the sea. Another speculative question now arises. Where did these rivers find their outlet? It could not be at the borders of the now Pacific. We know that there are great fresh water rivers running in, not into but far out at sea, and we are told of fresh water bubbling up in mid ocean. May not these lately developed mysteries throw some light on their presence? But I have no right to digress.

The next auriferous belt in point of elevation is the Slate belt. When I say in point of elevation, I mean that the slate formation is found higher than the gravel, although at the same time it likewise underlies it, frequently composing the bed-rock of the gravel placer diggings, and sometimes cutting them in half, as has been found by going through the supposed bed-rock, when the gravel has been found lying under it. Rich quartz veins traverse the slate belt in all directions, and nothing can be more diversified than the dip or inclination of the slate

beds themselves. Sometimes the strata are vertical, at right angles with the sky; again they will form a succession of angles; then again they will form a chaos of angles, crossing and recrossing one another and broken, or by way of change presenting a smooth lateral unbroken surface.

The last, grandest, most extensive, and least known is the Granite belt. Far up in the eternal snows and down to the foundations of the mighty hills is granite, ever granite. On the slopes of the Sierras the granite is intertwined with veins of gold-bearing quartz. It is supposed that the mother lode is there. It is the theory of the day that from that source flowed all the gold that is found in the rivers and streams and gullies and pockets and table-lands of the lower country. The quantity is inexhaustible, and the supply goes on day after day, as time slowly loosens the precious metal from its bonds of adamant.

The veins in the granite are hardly as yet worked. There is enough work in the quartz mines, of the gravel and slate formation, to employ the present thousands of workmen for many years yet to come, and population is so scarce and labour so dear, that to-day the mountain mines are not worked to advantage. And yet there are mines in the Alpine district on the confines of the state of Nevada, where you can see the gold sparkle in the croppings of the vein as it bursts out of the earth—hard and stubborn rock, however, to crush, as befits the rugged aspect of nature around. I have not seen a more bleak and wild country in all California than this. Constantly enveloped in clouds, with a cold wind whistling about your ears and chilling you to the very marrow, with no shrub but the ashy-coloured sage brush, with no tree whatsoever, with precipices for roads and boulders for pavement, the mine ought to be rich to repay life up there. And yet miners do live there and are happy.

THE GEYSERS.

AT SEVEN O'CLOCK in the morning I left San Francisco in the most convenient ferry steamer I have yet met with in the United States. The boat was originally constructed for the passenger trade between this place and Sacramento, but the railway has changed all that; and now the whole of the inside of the vessel is, as it were, scooped out, and one spacious carpeted saloon formed, with seats and plate-glass windows all around. One can either promenade as at a conversazione, or sit and enjoy the lovely scenery. For it is lovely as we skirt close to the shores of Angel Island, covered with wild flowers, which, as is generally the case in California, grow in patches all of one species. For example one sees acres of the yellow lupin, then again a tract covered solely with the gentle blue nemophila, or the orange of the escholtzia, which is popularly called the California poppy, so common in this country is it. Our way lies across the bays of San Pablo and Suisun until we come to a halt at the town of Vallejo, called after a Spanish general of that name, who had immense possessions in land and herds prior to the American possession of California.

Vallejo is a thorough mushroom town, or rather a succession of mushroom towns. For a brief period in the early days of California it was the capital, and the legislative wisdom met there in conclave; and hotels, bar-rooms, and money abounded, for those were the days of 'the session of a thousand drinks.' But the capital was removed just when the hall destined for the deliberations

of the senate and assembly was half finished, and it remained for years a melancholy instance of the vanity of human hopes, being finally broken up for building purposes. Vallejo rose again as the port of outlet for a large grain district; and San Francisco capitalists, after having first bought half the town for a mere song, erected elevators there, and loaded their grain ships direct at the wharf. During the war Vallejo gained in importance also, for the naval dockyard of Mare Island is only separated from it by a strip of water about a mile wide. The town finally made its great spring when it became the terminus of the California Pacific Railroad, which, becoming incorporated with the Great Central, and the line going direct to Sacramento, Vallejo became virtually the terminus between New York and San Francisco for passenger travel. The line, however, will be extended to Sancelito, a point on the opposite side of the Golden Gate from San Francisco, and distant from it about three miles, and then Vallejo will droop once more.

Vallejo is a pretty little town covering a conically-shaped hill, with a church at the top having a high spire, which makes it quite a landmark. The houses are mostly painted white, and have pretty little gardens. The only drawback to the place is the total absence of trees. This is being remedied by planting, so that the next generation may reap the benefit.

From Vallejo I proceeded by rail along the beautiful Napa valley. After leaving the small hills that skirt the bay, the road appears to be a perfect level; there are no cuttings, no embankments, no tunnel; a level tract of rich lands stretches on each hand, broken now and then by clumps of oaks. In the distance, and as if guarding the head of the valley, towers up the beautiful Mount St. Helena. Level as the road appears to the traveller, it gradually ascends until, at an elevation of three hundred

feet, the walls of the valley contract, and the line winds its way along the sinuosities of the level ground, something after the fashion of a river, until Calistoga is reached, and there this branch of the railroad ends.

Calistoga is one of the watering-places of California. It is situated in a circular basin of about a mile in diameter. The hills that surround it are covered with trees and vegetation. The bottom of the basin may be called a thin crust of earth covering a boiling lake, as if to keep it hot. Hot springs rise in all directions. Wherever the ground is penetrated hot water is found. There are also salses, or mud springs. The extinct crater of St. Helena forms one of the walls of the basin, and there is little doubt that the two have subterranean connection. About six years ago this spot was in all its savage wildness, but having come into the possession of a well-known San Francisco capitalist named Brannan, that gentleman determined to develop the natural resources of the place, and has laid out more than a hundred thousand dollars for that purpose. He began by building a colony of cottages round the rim of the basin. Fancy a cottage *ornée* with a deep balcony, a drawing-room extending along the entire front, subdivided by bedrooms in the rear. Fancy also every one of these cottages being precisely alike, so much so that they might have been cast in the same mould. Each cottage has a small garden in front, containing a date palm and a Monterey cypress. Attached to each is a small summer house of lattice-work with a little round table in it and other conveniences, each the facsimile of its neighbour. There cannot be any bickerings or jealousy among the guests, for there is no difference even in the chairs, the only inconvenience that might arise being that some belated or bemused visitor might find it difficult to decide upon his own particular domicile. To

obviate any such mistakes in the daytime, each house possesses either a classical or historical name, which is legibly painted over the porch, such as Neptune, Washington, Helena, Ralston, &c. The grounds are very prettily laid out, Mr. Brannan having endeavoured to plant them with every known species of Californian tree. There is the home garden, and the outer drive around two pretty little hills which look artificial, they are so round and smooth. They are named respectively Mounts Washington and Lincoln, and winding walks lead up to their tops. A large swimming bath is at the end of the garden through which tepid water is constantly flowing; and leading out of it is a skating sink, the inside walls of which are painted with scenes from the Arctic regions, sleighing, &c. When the hotel and the cottages are full the smooth floor is covered with beds for the bachelors; indeed, it is one of the airiest, nicest places to sleep in at Calistoga, where the thermometer stands at 90° in the shade.

Of the Springs themselves I can only say that their name is legion, and they run about everywhere asking one to test their medicinal qualities. Directly in front of the hotel is a reservoir of cold water full of gold fish. Immediately by its side is an artesian well, which has been bored to the depth of more than a hundred feet. The water from this is of the temperature of 175°, and of course visitors amuse themselves by boiling eggs in it. It is likely, however, to be filled up with broken glass, as when a bottle is let down at the end of a long string with a weight to go far down the water (a study in natural history performed by the majority of the guests), it generally happens that only the neck of the bottle returns. The next spring we come to is of pure soft hot water, and is used exclusively for the laundry which is built over it. Linen washed in it becomes very white, and the hot water is ever ready without fire or expense.

The great fun is the swimming bath before mentioned, where the young ladies take lessons, and one hears a confused noise of splash, scream, and laughter. A very serious-looking affair next claims our attention. We enter a small house, in one corner of which is something like a sentry-box, and in this sentry-box an iron chair. Ideas of punishment or imprisonment for the season present themselves to the mind, particularly as there is a square hole at the side where the incarcerated one might receive his daily rations. A trap-door is opened, and the mystery is explained. It is the vapour bath, temperature 195°. The victim sits on that iron chair doing penance in a white sheet, the door is closed upon him, and the hole at the side enables him to put out his head and gasp for life. When he is sufficiently *stuvé* the bolts are drawn, and what remains of the man staggers forth into the sunshine. It is a splendid cure, however, for rheumatism. A line of the regular hot baths comes next in order, temperature 90°, the water strongly impregnated with iron. About a hundred yards farther on is a little building which covers the sulphur bath, the most popular of all. The water is only moderately warm, but has a tendency to soften the skin as well as to open the pores to such an extent, that the bather on emerging, especially if the day be warm, cannot dry himself so great is the perspiration. The greater part of the water has the common chalybeate taste with the usual salutary effects. For my part I think that half the cure of the invalids that flock to the Springs arises from good air, cheerful society, good fare, and absence for the time being of the anxieties of daily life. He who brings his skeleton with him instead of locking it up in his safe, may drink a whole mineral spring, sit an entire day in the sentry-box, and sweat for a week in the sulphur bath, but he will ever remain in a state of biliary torpor. The air is so pure, the scenery is so lovely,

the ramble through the woods, where the wild flowers are in such lavish profusion, is so beneficial, that it is not astonishing the dwellers in cities exult like escaped prisoners when they come to Calistoga.

In front of the hotel is a large grotto, composed entirely of the petrified trunks of trees. There is a forest of such about four miles from the hotel. There are various orders of trees, including the pine, the mansanita, the oak, and others: some are prostrate, some upright, but there they are stone witnesses of a past action of nature. My theory is that the forest was covered in past ages with a stream of silicious mud flowing from St. Helena, which mud penetrated into and petrified these trees. Subsequently the action of time and the elements wore away the surrounding mud leaving the trees standing. Earthquakes and storms have thrown down some, and parasites wind round the upright stems of others. The fact that the trees were petrified ere they fell is proved by the circumstance that those which are prostrate are fractured as stone pillars would be under similar conditions, not crushed or split like ordinary trees. Between five or six miles from Calistoga are the White Sulphur Springs, another favourite resort for Californians. I was strongly recommended to make the ascent of Mount St. Helena and enjoy the view at sunrise, but I confess that I shunned the fatigue. I was told that the panorama is superb, with the whole valley at one's feet, and the bay of San Francisco like a lake of silver in the distance.

During the season there is splendid shooting in the neighbourhood of Calistoga. Since the warfare carried on by the farmers against coyotes, foxes, and other vermin, that played such havoc with the small game, it has increased wonderfully; and it is no uncommon thing to see colonies of quail running among the chapparal or low brushwood, and perching on their branches, for the

California quail perches even in high trees. Both the brown bear and the grizzly are to be found up in the mountains, as well as that delicious bird, wrongly called there the prairie hen, when it is in fact more allied to the capercailzie of Norway, or the large grouse of British Columbia. There is likewise a species of large hare that abounds in this neighbourhood: it has immensely long ears, whence it is vulgarly known by the name of 'Jackass rabbit.'

Early one morning we left Calistoga in a kind of char-à-banc, known here by the name of 'mud waggon.' Four good horses carried us over a spur of St. Helena which gave us a faint idea of the view from the top of the mountain. After a delightful ride of a few hours we arrived at Healdsburg, a pretty little agricultural town, well laid out and embosomed in trees. The town having been founded by one Heald, he has taken care to hand his name down to posterity, not only through the name of the place, but also of the majority of the buildings in it; for example we have Heald's Hotel, Heald's Institute, which is a stationer's shop where they sell newspapers and fruit, Heald's grocery, &c. Here we were introduced to the renowned Foss, a man who drives faster, drinks more whiskey, and has fewer accidents than any stage coachman in California. He was the first man to drive down the mountain's side to the Geysers before the present zigzag road was made by which the stage now goes to the bottom of the valley. I was offered the choice of going by the coach, or going on to a place called Ray's, where horses are in readiness to cross the range. Preferring to trust myself rather than anyone else, I chose the latter, especially as on horseback one has less dust, and can enjoy the scenery better. We drove to Ray's, along a beautiful road through a country like an English park, studded with clumps of trees with here and there

orchards of peaches and apples and pears, together with vineyards.

Ray lives by supplying horses to tourists, some five unhappy Californian specimens of which were standing with resigned looks awaiting our arrival.

Having selected one I got on, and began the winding ascent of the mountains. The road was very steep, and here I experienced the virtue of the Californian saddle with its peak. I also discovered the hitherto hidden virtue of my beast. No persuasion of whip or spur would make him deviate from the nearest and best way to the Geysers. He was bred, as were all the others, on the ranche; their life has been passed in taking travellers to the Springs, and they will not be seduced into taking any of the tempting short cuts leading the unwary to pleasant pastures but not to their destination. We had left Ray's about four o'clock, and now the sun began to set. There was a glorious flood of sunset over Russian River Valley; a rush of purple light and the mountains of the coast range grew grey and indistinct, till the moon, which was nearly at the full, rose slowly, changing the purple and grey to yellow. Ever climbing, sometimes in the shade of the mountain, when the uncertainty of our way and the gloom gave a sense of danger which engendered silence, then emerging into the light again, we saw the road and our party grew chatty and at ease, At length we reached the top, and then began the real difficulty. Our path lay along the ridge of the mountain called the 'Hog's Back,' covered with loose stones; in some places it is only about two yards wide with a precipice on each side. Here we had to trust entirely to our horses. This ridge is three miles in length, but appeared longer. At last we arrived at the peak round which we skirted, and before us lay the gloom of the forest. Like all California mountains, one side exposed to the sea breeze was tree-

less, the other looking east densely wooded. Here we bid farewell to the much-prized moonlight, began to descend, and wonder when we should get to the bottom. Finally my faith in the horses began to be shaken; it was so dark, the trees were so high, and their outlines so alike, that, had it not been for the constant jar on the horse's shoulder, indicating that it was going down slowly and steeply, I should have thought that the brute was describing a circle. At last, when really tired and unmistakably cross—when the sameness of the gait and the dead silence around became very painful—a strange sound was heard; a hissing and then a villanous smell of sulphur. I had hardly time to say, 'By Jove, we must be near the Springs,' when a sudden turn in the road brought us to a courtyard in the front of an hotel, full of lights and bustle of unpacking mule trains, unslinging saddle bags, helping to carry baggage, laughing and talking and forgetfulness of fatigue in the pleasure of arrival, all in strange contrast with the desolation of the previous moment; and, where the moonlight streamed up the gorge, it fell upon a column of steam.

The next morning was beautiful. The cold air condensed the vapour and it hung over the boiling springs. The sun had risen, although it had not arrived at the valley, but the tops of the opposite hills were glowing with its beams. I started on the ascent of the great cañon, and toiling along over rocks and through dense brushwood arrived at the first ebullition, two large pits, seething, bubbling, and swelling, with the ground crumbling under one's feet, higher and higher up the gorge, till I came to the top, about a mile from its commencement, where the stream of mingled fresh and sulphurous water runs away, and then the path dips over a ridge. The view from the top was very striking. You look at the opposite hills densely wooded; you see rising on each side the

same heavily timbered precipices, from which there seems to be no possibility of escape; whilst all along the cañon is the noise of steam escaping, and great, grey, bare spots where no vegetation exists; these are beds of sulphur nearly pure. Descending carefully, and peering into innumerable boiling springs, you arrive at the large Geyser, which is frightfully impressive. You climb up scoriæ and piles of hot sulphur, and look into an immense cauldron of black boiling pitch water, always intensely agitated; and now and then, as if struggling to get away from the undercurrent of torment, it makes one vast upheave, and you fear that it is going to overwhelm you. I cannot describe this perpetual strife—this fearful struggle of nature. It is what is going on under the earth's crust laid bare in a small way to poor weak man, who can only look, fear, wonder, and comprehend nothing. I lowered a bottle; it split into a thousand pieces. With a second I was more careful, allowed it to temper, and filled it. During our descent I collected five different sorts of water: one like vinegar, strongly impregnated with alum, used by the Indians as a lotion for the eyes; one that deposits green crystals of copper; one boiling hot, one clear and tasteless, one of sulphur and iron. In a large pool you can bathe either in hot water or cold, a spring of pure cold water flows in on one side, on the other boils up one of the thousand geysers. Immense beds of pure sulphur cover one side of the cañon, at the bottom of which a gentle streamlet winds its way out of this valley of the shadow of death.

THE YOSEMITÉ VALLEY.

WHAT traveller is there that comes to California who does not, almost immediately on arrival, ask about the Yosemité? The ignorance of some is supreme. They think they can take a carriage from the hotel, and go there as to a picnic; just as miners in the olden days, who used to wander about the outskirts of the town looking for the diggings. For my part, I confess that one of my great inducements in visiting California was a pilgrimage to the valley.

The usual tour formerly was by way of the Big Trees, thence across the country to Coulterville. Now, however, in consequence of the railroads to those places being partially finished, I was advised to go to the Yosemité and return, doing the Big Trees separately. I recommend all travellers to do the same, and have as little to do with stages as possible. The roads are rough and dusty. There is no limit to the number of passengers; some of them Chinese, who smoke execrable cigarettes. In short a stage journey is an infliction to be borne in order to travel from one place to another; you are choked with the dust, starved by the dirt and badness of the meals, wearied with the ceaseless jolting, and bored to death by the monotony of the scenery. Having thus said I shall never refer to this discomfort again, only let it be perfectly understood that, when I mention stage travel, I have suffered as above described.

I left San Francisco at four o'clock in the afternoon by steamboat for Stockton, preferring this longer way

to the more expeditious rail, as I proposed returning by that mode of travel. We steamed along the bay, retracing my previous path until the mouth of the river San Joaquim was reached. It was a lovely evening, and the setting sun had a magnificent effect upon old Monte Diablo as we rounded its base, for the bay literally winds round the base of the mountain. At the delta of the river we came to a remarkable instance of fertility, in the shape of several islands that were formerly tule marshes, but which have been reclaimed, immense drains having been dug across them, and being surrounded with a wall or dyke to resist the encroachments of the tide. Sherman Island, containing about twenty thousand acres, was one of the earliest reclaimed, and still remains the most valuable. Immense crops of grain, potatoes, and beets are raised, the two latter attaining huge proportions; and, to give an idea of the first, I will only say that fifty-eight acres of wheat yielded more than four thousand bushels this year, being nearly seventy bushels to the acre. The soil is inexhaustible being composed of the diluvium of ages.

Had it not been for the bright stars overhead and the absolute repose that I enjoyed, I should have found the latter part of the journey monotonous. The river winds its way through a boundless expanse of tule marsh, and the silence is only broken by the throbbing of our engine, or the croaking of myriads of frogs. There is no hum of midnight as in the tropics, where animal and insect life alike rejoice in the coolness. The river is the most winding I ever travelled upon in my life. Through the dimness of the night I could see the great mainsail of a schooner as it apparently drifted slowly by us, and yet I thought I could distinguish the banks of the river between us. It was so, that vessel was going the same way that we were, and was

five or six miles ahead of us by water but only a pistol-shot distance by land. To a stranger the navigation of the river is exceedingly difficult, as there are many sloughs that are larger than the river itself at their mouths, which might easily be mistaken for the main stream, and which end in a labyrinth of smaller sloughs wherein the voyager gets bewildered. A gentleman from San Francisco who ventured to go up the San Joaquim in a sloop with only a boy to assist him, got lost in that way for a whole week, and was only rescued at last by some Mexican fishermen who had seen his signal from the masthead. A slough (pronounced here as the word plough) means an arm of the river that runs for miles and miles inland ending as I have said.

Stockton is situated on one of these sloughs, and its position was so chosen because it is the head of deep water navigation, except during the time of the melting of the snows, when steamers can go a hundred miles higher up the river. Stockton formerly enjoyed the same advantages that have been stated about Sacramento. It was the grand depôt for all the southern mines. Every evening the great plain that stretches away from the town was alive with the loaded waggons, and merry with the sound of the bells of the mule-trains going to Mokelumne, Sonora, Columbia, Mariposa, Hornitas, Knight's Ferry, James Town, and the numerous mining camps so rich in their surface diggings. In this respect Stockton was much more picturesque than Sacramento; for the whole of the carrying trade encamped on this plain, and at night the twinkle of many lights, the song of the muleteer (they were all Mexicans), and his vociferous talk to his animals, the animation of much life, and in the grey morning everything was astir. Stockton is now the great grain depôt for the valley of the San Joaquim, which is one of the granaries

of California, for the Calaveras county, rich both in cattle and grain. It is a pretty little city in a great plain bounded by the foot-hills of the Sierras on one side and the Monte Diablo range on the other. All its houses have nice gardens, and their orchards are full of peach, pear, and cherry trees; apples don't thrive well. The peaches are especially delicious. Stockton is called the City of Windmills. The town depends upon its wells for water which, according to the American manual-labour-saving-system, must be mechanically raised to an elevated tank, and thence distributed according to the laws of pneumatics.

From Stockton we took the train to Modesta, which is as far as the San Joaquim Valley Branch of the Central Pacific is made. The road lay for the whole distance along the great plain, which is brilliant with flowers in early spring, but then was bare as an adobe brick, with the exception of here and there a low bush with bright green leaves, which I was informed was a datura and a deadly poison; no cattle will touch it, and it grows where all other vegetation would perish. At Modesta I took the stage to Coulterville, where I joined a party who were going the rest of the journey on horseback. The livery stablekeeper at this place has always a supply of horses on hand ready for this emergency. At daybreak we had the usual allowance served out of bad coffee, redeemed in this instance, however, by fresh eggs and good home-made bread, in the place of those indigestible balls called hot cakes. We rode after breakfast over barren but wild scenery, large croppings of trap-rock starting out of the hot hill-side, oaks without a breath of air to quiver their green leaves; fir trees began to occur at intervals, showing that we were gaining in elevation; in fact, we were now among the foot-hills of the Sierras. After ten or twelve miles

riding we dismounted, and went to see what is called Bower Cave, one of those houses that nature builds. It is about a hundred feet deep, but I would not go out of my way to see it. After this the scenery became very fine. Again I was among the grand old pines, and the whole air was aromatic with the smell of the forest. We turned out of the beaten track to see a small grove of genuine big trees. Our guide pointed out two to us which he said bore the name of the 'Siamese Twins;' they are noble trees, and both grow from one root. The place is called Crane Flat. We slept there, and the following day set off as early as possible for the valley. Fifteen miles rough riding through the same glorious mountain scenery brought us to the heights above the valley, where we were recommended to rest awhile. After that a most fatiguing *descent* they call it, but it was more like a fall of five miles in and out, zig-zag, over rocks and stones, stumbling, stopping, sliding, everything but falling, till we got to the bottom, and then seven miles more to the hotel.

The Yosamité Valley proper is seven miles long. It can hardly be called a valley. It is in reality a rift in the earth's surface. Let the reader fancy such a chasm, of a width varying from one mile to ninety feet, with granite walls from one thousand to four thousand feet; that is to say, from one-fifth to three-quarters of a mile high. Let him imagine some of these masses of rock to be detached, and standing in all their solitude like giant obelisks. Let him picture others cleft from top to bottom as though by a thunder-bolt. Added to this let him imagine a river, cold as ice and clear as crystal, following the windings of the valley, that same river having descended as from the clouds with the thunder of a great flood. Let him conceive the most luxuriant vegetation and the extreme of barrenness, the softest

carpet of moss and grassy lawns and great ferns and wild roses, alternating with the huge scathed rocks, where not even the lichen will cling, and then he will have a prosaic idea of the Valley of the Yosemité.

But it is impossible to describe the endless charms of light and shade and colour and form, or to picture the sunbeam as it strikes the summit of one of the giant sentinels, or to note it stealing down the sides of the cold walls and then filling the whole valley with a flood of glory, relieved here and there by the deepest shade, more gloomy still by contrast. Here are spots where the sun never shines, cold and damp and dripping for ever, and others where the gorge opens its arms wide to receive the bridegroom and bask in his rays; some where the river hurries along anxious to be free from its stony prison, and others where it expands into a still deep lake, as if for rest and enjoyment of the lovely scene, for it takes it all in, and in its inmost depths the whole valley is mirrored.

I have not mentioned the Falls, nor can I think that any two men can describe them alike. Both the man who looked upon them practically as good water-power and he who fainted from excess of emotion on beholding them were true in their own way, but how different was their mental vision. For my part I was conscious of a waving in the air of thin streams of water that looked like spun glass, elsewhere of an overwhelming sound of mighty floods, an overpowering sensation that made me gaze into the unfathomable deep that received them; at another time a feeling of being carried away by a torrent, and yet everything moving but myself. At one place there was a still stranger feeling of everything moving but the water.

The reader will perhaps understand this when I detail the course of the valley, which I will now proceed to do.

First of all, as everybody is told by the guide, the word Yosemité is the Indian for Big Grizzly Bear. It is not one word but three or four joined together. There are two ways of entering the valley, the one by the Mariposa and the other by the Coulterville trail. The place where the traveller first strikes the view of the valley from Coulterville is called 'The Stand-point of Silence.' That from Mariposa is called 'Inspiration Point.' True to the trapper instinct of the Western man the American names everything, and almost all the names in and about the valley were given by one Hutchings, who first located the valley and established the first and for a long time the only hotel there. Consequently he sought the most romantic and captivating names, and being a bit of a scholar, having edited a magazine in San Francisco, he did not choose badly, although perhaps it would have been in better taste to have adhered more strictly to the significant Indian names. The view from 'Stand-point' is very grand. The valley is a mile below you apparently plumb at your feet; a haze covers the lowest part. Immense fir-trees are dwarfed by the distance. The bridal vale looks like a stream of water whose flow has been suspended, for you see no motion, nor at that distance can you hear the sound of falling waters. The bridal veil is the first object that is pointed out after you have descended into the valley. It appears to be a mere vaporous, but is nevertheless a considerable, volume of water flowing from a great height. Hardly two days in the year is this volume the same; a warm day in spring, or a warm rain, will melt the snows that feed it; the contrary will lock up its sources of supply; and so it goes on, ever falling but ever changing, till summer, when it dwindles to a mist of water and finally ceases altogether. The Indian name is Pohono, meaning spirit of evil wind.

Next we come to the Cathedral Rocks, 2,660 feet high, with the Cathedral Spires, two granite needles, 2,400 feet in elevation. Then looms the solitary Sentinel Rock, grey and fissured; it stands at a bend of the valley as a watch upon those approaching, and is 3,043 feet above the river. After that climb up some rocks slippery with spray, yourself drenched with it, and at intervals you will catch a glimpse of the Vernal Falls, which are only three times as high as Niagara. This is an immense body of water as green as grass, and it appears to come down noiselessly till it strikes the basin below. Not so the Wild Cat Falls, which are not far off, for they come rushing and whirling and seething, and one might say scratching their way among great boulders, some of which they leap over whilst others divide their waters. For some distance now the journey along the valley is somewhat fatiguing, and if the traveller be a good walker he had better dismount. In fact the whole of the valley is done best on foot, if time and strength will allow it. Nevada Fall nexts greets us. It is an immense sheet of water at the early part of the year, and is the main stream of the river Merced, the others being merely branches or forks. This comes shooting over a smooth unbroken ledge 700 feet over our heads, and plunges into a chasm with a roar that imposes silence. After these falls the valley widens, and the river here has spread out to the lovely Mirror Lake, covering eight acres of ground. It is immensely deep and as still as death; the whole of the surrounding objects are reflected in it with startling distinctness. The water is so dark, and the objects in the sunshine are so bright, that their image is mirrored to the minutest detail. I was told that photographs have been taken here that for a moment puzzled the beholder which was the right side up. The last and greatest fall of all is

very properly named the Yosemité, it is more than half a mile high, being 2,641 feet above the valley, and claims to be the highest known waterfall in the world, although recent travels say that one on the Yellowstone river surpasses it. The fall is broken near the middle by a projecting ledge of rock, excepting at the time of floods, when it shoots with such velocity from above as entirely to pass beyond the obstacle. Three elegantly shaped pyramidical rocks now present themselves; they are christened the Three Brothers, but as they all lean forward in one direction, the Indians say that they are playing at leap frog, which is one of their games. The valley ends with the grand old Rock Mountain now called El Capitan, but by the Indians the Chief. It is the most massive, grand and majestic of the whole series. The top appears to be flat in the distance, but sheer down from that 4,000 feet of bold rounded granite bluff. It stands there like a fortress, grey, gaunt, and commanding. Well might the Indian reverence it as the Head or Chief. The great trees on its summit, as they show through openings in the mist that is sweeping over it, appear like nine-pins, and the Three Brothers that would be giants elsewhere are dwarfs here.

The old mythological Titans recurred to my mind more than once during my trip up the valley. These great rocks are so mighty, so desolate, so powerful to all appearance, and yet so still, so beat upon by storm and yet remaining in such unmoved majesty, that I could not but create this as the valley they were confined in by the younger gods, and that their giant forms were changed into these gaunt masses of granite.

The ascent of the Sentinel Rock is practicable from its eastern side, but as it is a long and fatiguing trip, not giving as good a view of the valley as from Inspiration Point, I did not undertake it. I have attempted to give

a general description of this wondrous cañon, but the camera is a more faithful and expressive delineator than I am, and the numerous photographs that are published fully illustrate that which I have but catalogued. Those who are weary of European travel will be amply repaid by visiting California, the greatest of whose attractions, in point of grandeur of scenery, is without exception the Yosemité Valley.

THE BIG TREES.

THESE I have always called by their popular name, and the only one they are known by in California, for were I to inquire the best way of seeing the *Sequoia gigantea* or the *Wellingtonia*, I should most probably be told that they didn't know such a person; so I will confine myself to the old familiar term.

I went to Stockton as before on my trip to the Yosemité, this time however by rail. Left San Francisco at four o'clock, crossed the bay to Oakland, jumped into the cars, and was in Stockton a little after eight. Nothing very striking on this line excepting the scenery through Livermore's Pass, which is in the Monte Diablo range of mountains. Early the following morning by train on the Copperopolis line as far as Milton, along the plains all the way. Copperopolis was famous at one time as containing mines of untold wealth. An immense deposit of copper was found there; mines were sunk in all directions; claims were taken up, companies formed, and as usual an excitement took place. The Union Mine was sold for a million and a half of dollars. Copper ore was found everywhere, large quantities were shipped to England, and all seemed to be flourishing, when the Swansea panic ensued. Chilian and Australian copper was a drug, and of course poor little Copperopolis was nowhere. There is not a single mine working, nor has one cent been returned of the hundreds of thousands sunk in developing them. Still the copper is there and the mines can be worked should the price rise. From Copperopolis through

Calaveras county by stage. I say no more than that we arrived that evening at a very comfortable hotel at Murphy's. After a capital breakfast the following morning I hired a horse and set off for the Trees. I should mention before hand that Murphy's was at one time one of the busiest mining camps in the southern district. Millions of dollars have been taken out from the streams and gulches that surround it. Crowds of people filled its streets nightly, shopping, drinking, and gambling. To-day all is quiet. A few companies are working deep claims, there is some little hydraulic washing going on, but to all intents and purposes the town of Murphy's is a dead letter. Whether Murphy remains there I know not; whether he is alive I did not inquire, but should he be in the spirit world his ghost will flit in melancholy mood among empty stores and shanties and houses which don't even take the trouble to announce themselves as 'To let'—they are so hopeless, so forlorn.

I did not enjoy a ride during my whole stay in California more than this. The fresh morning air came down from the pine-clad mountains, everything was in perfect harmony with the equilibrium of my physical self. I had slept well, had enjoyed a good breakfast, my horse appeared to be a good animal, and I was going to see one of the wonders of California.

The road was a gradual ascent; by its side ran a brawling brook, just as one sees in England, and the first roadside streamlet that I had met with in California. It was side by side with me for about three miles, leaping and dancing, sometimes shaking the tips of large ferns as they slanted over its surface, and then sliding down great smooth slabs of stone, or clattering over the small talk of pebbles. I loved that little brook. My romance was somewhat dispelled on arriving at the top of a ridge, by the discovery that it was only the waste water of a ditch, or flume, that

was carrying part of the north fork of the Stanislaus river to some mines in the mountains.

My way now lay across a broad plateau laid out in one of nature's parks. Immense oaks of every variety, horse chesnuts, the numerous species of fir trees (conspicuous among them the Douglas pine), which in height but not in girth rivals the *Sequoia gigantea.* Under my horse's feet the softest sward covered with pine leaves, that are always dry and always aromatic. The very air was life-giving, and, as I wended my almost noiseless way, no sound of beast or bird broke upon the silence save the mournful cooing of the mountain wood-pigeon, which grows to a large size in these altitudes. The distant landscape, as seen through vista after vista, was grand in the extreme—the long roll of the foot-hills gradually melting into the great plains, the mists that hung over these shining in the sun like an ocean; and, on the other hand, almost over my head, the cold sharp white peaks of the Sierras. For a time the mountain chain would appear to be broken, but, far in the distance, the eye would light upon what appeared to be a marble city in the heavens, of white domes and palaces and spires, such as the apostle of the Apocalypse was permitted to behold. It is the cluster called Castle Peak, sixty miles off, whose base is hidden by the clouds.

I heard a sound of dogs barking, and it was a relief, for even beauty becomes monotonous, especially when one is alone with it and jogging along to a certain destination, which naturally one is anxious to reach.

It was the 'half-way house,' where the stages and travellers stop, for it becomes almost a duty to alight at the only house on the road, especially a hostel in the Sierras. The place is owned by a Mexican, and 'tended' by his housekeeper, who has a considerable degree of Indian mingled with a squeeze or two of Castilian blood.

They eke out their living by selling lager beer and bad whiskey to the passers-by and the vaqueros, who watch the herds that pasture on the table-lands and in the valleys. She showed me several fine skins of the silver and red fox, grey wolf, skins of birds, squirrels, &c., and sells them for a higher price than you can buy them in the city. But then the charm of having bought them on the very spot from the hands of the hunter, this it is which enhances their value, and swells the revenue of the landlord of the half-way house.

Soon after leaving this place the forest becomes denser, and it is necessary to keep to the trail, for, once lost in the pathless woods, the chances are that you will be lost for ever, unless the superior intellect of your horse extricates you from your dilemma. The great straight trees were here in all their majesty, now and then a dead bough would fall to the ground and almost startle one by breaking the silence. Further on I came to a saw mill. I had heard the unwonted sound of labour some two or three miles off, and the sharp ring of the axe echoed like a warning among the trunks of the trees. For their turn will come some day, and the more upright the trunk, the purer the grain, and the sounder the heart, the more surely will the axe be laid to the root. So it is elsewhere, but I wont moralise. I was glad when they told me that I had only two miles farther to go to the trees. The road now began to descend, and little streams ran across and soaked themselves into it, making it rather soft treading for my horse in some places, but I suppose he was accustomed to it as doubtless this was not his first visit. Indeed I was soon conscious that he was an old stager from an increased animation in his gait, and evident desire to get to the end of the journey. Presently I arrived at that mark of civilisation a signpost, on which was inscribed, in storm-beaten letters, 'To the Big Trees Hotel.' Down

a little fenced lane, and straight before me stood the first two of the monarchs of this grove that I had seen—the 'Sentinels'—the road to the hotel craftily arranged to pass between them. I was told by everybody that I should be disappointed in my first view, so I wasn't. They are not so symmetrical as the Mariposa trees, nor so graceful as the Douglas pine, but they are awfully grand. Their tops are all gone, stricken off perchance by the lightnings that have played among them for fifteen hundred years. Their summits are ragged and gaunt and riven with the storms and the hail-beat and the snow drifts of centuries, but their giant frames are as noble as their stature is vast and their bulk enormous. Their roots are deep in the ground, and well they need be to resist the blast and draw up nourishment for the trunk. One thing about these trees is very striking, and that is the great height at which the first branch springs from the parent stem. A hundred and fifty feet from the ground a small sprig apparently shoots out nearly at right angles, cut it off and a mighty tree comes thundering down. This is verified by measuring the limbs of those which are prostrate.

Here is a very pretty hotel, well kept by the same people as that of Murphy's. No guide is here wanted, so I wandered about untrammelled by one of these necessary nuisances. The 'Mammoth Tree Grove' is at the bottom of a shallow basin in the mountains. To be irreverent to such an ancient fane, I would say a soup plate rather than a basin, for the bottom is flat and the sides rise very little above it. The trees are, according to some botanists, of the same family as the California red wood so much used for building purposes; indeed, a scientific gentleman with whom I became acquainted assured me, that it was the red wood much increased in size under peculiar advantages of soil and situation. I am almost inclined to agree with him. The foliage of the two is precisely alike,

the cone is the same, and the colour and perfume of the wood are similar. Now the peculiar condition under which these big trees find themselves eminently conduce to their growth. The soil is as rich and virgin as undisturbed accumulation can make it. There is no limit to its depth. Streams of water trickle over its surface and penetrate its inmost recesses. The floor of the grove is perpetually green, and great forests shelter it all around. No wonder then that, with these advantages, the red wood, itself a giant, became greater than the giants the demigods of the forest.

The proprietors of the grove have named almost every one of their ninety trees, and I cannot say that I admire their nomenclature. That they intend it to be final is evidenced by the fact that they are painted on tablets which are let into the trees. That they should have Washington and Lincoln is natural enough, but when one finds these hoary monarchs named after Starr King and minor unknown California lights, we look upon it in the light of *lèse majesté*.

There are some redeeming names however. For instance a group of three that intertwine their topmost branches is called the 'Three Graces;' another is called 'Hercules' very appropriately, for his trunk is immense. One other, standing away from the rest, is called the 'Hermit;' and a noble tree bears the title of the 'Pride of the Forest.' That is better than localising them.

The average height of the trees is three hundred feet. One of them, called the 'Horseman's Ride,' has been prostrate for a long time as the soil has accumulated high up its sides. It is hollow, and a man on horseback can ride upright along the cavity for a distance of seventy-five feet. This tree must have been four hundred and fifty feet high, and forty feet in diameter. On the stump of the large tree that was cut down in 1854 a room has been built,

which is thirty feet across. When this tree was separated from its trunk by dint of five men boring holes and sawing for twenty-two days, the base was so large that the severed part would not fall; nothing but a hurricane would have lifted it away. However, by a system of levers and wedges, they at last tipped over this king refusing to abdicate, and now profane his fallen might by playing ten-pins, along his body, and a very good ten-pin alley he makes too.

The wild flowers here are exceedingly beautiful. The succession of seasons gives a series of species from the hardy shrub of the north to the warm-coloured, highly perfumed flower of the sunny south. Roses and azalias, snowdrops and most fragrant lilies, the dogwood tree with its snowy blossoms, all take their turn after the May sun has melted the snow. In winter the house is shut up, and left in charge of the motionless sentinels.

The visitor will notice how many of the trees are damaged by fire at their base, and, on inquiring the reason of such Vandalism, will be told that it was done by Indians in the days when no White man trod these wilds. The grove was a favourite resort for game on account of herbage and water. The Indians used to surround it, and then set fire to the grass which, communicating with the trunks of the trees, drove out the animals. The bark however I was happy to learn, although fifteen to eighteen inches thick, is rapidly growing over the burnt spots, and I was astonished at being shown how much it had grown on one tree in two years. As an instance of the vitality of these monsters I may mention, that the tree is yet alive whose bark was stripped off and exhibited at the Sydenham Palace, alas! only to be destroyed by fire.

MINES AND MINING.

THE richest gold mines in the world, and the most favourably situated. There is gold in Siberia, but it is obtained amid the severities of the arctic region. There are 'Afric's golden sands,' but none but a negro can collect them. The mines of Australia are devoid of water compared with those of California, and are more difficult to mine in consequence of the gold lying at a great depth. In this state, the miner can work for ten months of the year with no other shelter than a tent, and no floor but the bare ground. For six months he can live under his leafy *ramade*, made out of the branches of the chapparal. As regards 'placer' diggings it is the luxury of mining, and formerly was more so than at present.

In the early days, a party say of four or six, left a mining camp. A mule was packed with their tools, blankets, &c. and a sack of flour and some bacon. Each of them carried a rifle or gun, and thus equipped they plunged into the hitherto unknown and unprospected country. I will presume them to know something about mining, and to be able to read 'signs,' and wash a pan of dirt. They follow one of the forks of a river, and prospect the gulches as they go along. They notice where the river makes a sudden bend, and forthwith they cut down a few trees that grow on its banks and make a wing dam; that is to say, they shunt off the river where the eddy is,

as it rounds the corner, and, having diverted it, prospect the bottom. If it promises well there they camp. Their wing dam is strengthened, the river bed is exposed, and some of the party are despatched to the nearest mining town for a stock of provisions. By and bye other prospectors would come along, and would be shown how they were doing without the least hesitation, for there was no jealousy in those days, no petty concealment either of good or bad luck, and always a hearty welcome for the wayfarer. Those were the golden days of California ere it was scratched and raked and poked into and burrowed, as it is now. Those were the days of rockers, and long toms, and coarse gold, that begged to be dug up and coined and sent on its travels over the world. Those were the days when men were rich at noon on Saturday and returned to their claim on Monday morning cleaned out by the gamblers. Those were the days when everything was paid for in dust, and the scales were rather in favour of the shopkeeper, and gold was only worth fourteen and fifteen dollars an ounce in the mines, at least the agents of the San Francisco bankers would not give more. Those were the easy, extravagant, rich, wicked, thoughtless, generous, happy days of California. They were the early days of gold mining.

To-day it is very different; mining has become a science, a labour, a work wherein mere animal force alone will not suffice; a work requiring brain, patience, and capital; and it is of this last, which has personally come under my observation that I proceed to speak. Gold, silver, and quicksilver are the principal products of the country, and it is with gold that I will begin.

Gold mines may be divided into two generic heads—placer mines and quartz mines—all others are subservient to one or the other of these. In placer mining the gold is found with gravel, sand, clay, or other foreign sub-

stance. In quartz mining the gold is either in veins, or permeated in quartz. In the first instance the gold is free, in the second it is imprisoned. In the one case water is used to cleanse the precious metal from its impurities, in the other mechanical force is employed to release it from its bonds.

Water is the most precious commodity in California, and nature has bountifully supplied her with it. There are the American, Sacramento, Yuba, Feather, Bear, Tuolumne, Stanislaus, San Joaquim, and many other rivers running through the different mining regions, the head-waters of which are brought by flumes or ditches to supply the hydraulic or sluice washings. These two latter are alone employed in placer mining. A sluice is a large trough of strong timber, into which the pay dirt is thrown, and a stream of water passed through. The trough is slightly inclined, the angle being varied according to the nature of the diggings. The general width of the sluice is from a foot and a half to four feet, and its depth from eighteen inches to two feet. It is sometimes a mile long. The end of each trough fits into the end of the one immediately after it, and the whole is sufficiently raised from the ground to allow the miners to turn the dirt over as the water runs through it. The bottom of the sluice is covered with what are termed riffle bars, that is, transverse pieces of wood which catch the heavy gold as the water separates it from the earth. These riffles are of many shapes and devices. Sometimes they are merely strips of wood nailed across. In others, round pieces of wood made of sawn sections of a tree are laid on the bottom, touching each other at points in the circumference, the intervening holes being the traps for the gold. This is the best sort as they protect the bottom of the sluice from being worn away by the stones and gravel, and are easily taken

up and replaced. The sluice being pretty well filled with dirt almost along its entire length, the water is turned on. It dissolves the finer particles of clay and dirt, washes away the sand, rolls down the stones and boulders, for everything is shovelled, and men stand all along to throw out the stones and gravel after they are washed quite clean. When the water has been running a certain time quicksilver is introduced at the head of the flume, which works its way slowly downwards, all through the dirt, gathering the particles of fine gold in its course, and forming an amalgam which sinks into one of the riffle holes. Were the gold coarse the quicksilver would not be wanted; but as every species of earth is thrown into the sluice, from the top dirt down to that resting on the bed rock, of necessity much fine gold is mixed with it, for as a general maxim it may be laid down that surface dirt contains only fine gold, and the deeper you go the coarser the gold becomes. Well, man and water go on working away all day, he supplying the waste made by the water, and the quicksilver goes stealing about picking up stray particles, and the boulders are jerked out with a blunt fork when they get bright and clean. Young miners use their fingers at first for that purpose, but they soon leave off when the cracks come in their hands. This goes on sometimes for a fortnight, sometimes for a month, the sluice being watched at night, for there are always inquisitive people who like to peep into the riffles, and have no scruple at helping themselves. At the end of this fortnight or month, called a 'run,' comes the cleaning up. No more dirt is thrown in, and the water is allowed to flow till it runs out of the end quite clear. The riffles are taken up one after another, and that which has lodged in them washed down until it can be scooped up with a kind of large spoon and put into a pan. This is the most

interesting and important moment for the miners. It is a kind of holiday as well, for the labour is little or nothing. The body of them follow the riffles to the end, leaning anxiously over the sluice until the last batch of amalgam, or lumps of coarse gold, are taken out; that is, when they are all partners, as was more the case formerly than now. To-day a sluice claim is often owned by one or two who hire labour to work it.

Ground sluicing is a primitive but very rapid way of mining. Suppose a small dry gulch runs up the sides of the hill, water is brought to its head and flushed along it, while workmen stir up the bottom as the stream flows along, so as to wash away the clay and sand and gravel, and leave the gold comparatively bare. This is rather a wasteful method of mining, and can only be used when the gulch is rich and the gold coarse.

But the most powerful placer mining agent is the hydraulic power. A stream of water is led to a small reservoir connecting with a hose of from four to ten inches in diameter. This hose is made of very heavy duck sometimes strengthened with iron bands. The nozzle is like that of a fire or garden engine narrowing to its end. Two men hold it, the water is let on. The nozzle is turned towards the side of a hill and immediately it begins to melt away. Great care, however, must be taken not to bring too much of the overhanging cliff down at once. The whole system is undermining or sapping the base, so they play away below, and with the usual improvidence of miners and anxiety to bring down as much earth as possible, they frequently go too far and get buried. When that is the case they have to be washed out in their turn. It is incredible what this hydraulic power will perform. At Timbuctoo miles of the mountains' sides are washed away. The Yuba, into which run all the tailings, or waste earth, has its bed

raised seventy feet by this cause alone. With two hundred inches of water, two hundred and fifty thousand cubic feet of dirt can be washed in a working week. Now supposing the cubic foot to contain only one cent of gold, that would make a good sum. But three cents a foot may be taken as a low average, so it will be seen that a company of miners can afford to spend a small capital in bringing water to such a claim. The water, however, is generally brought by another company, who charge the miners for the use of it at rates varying from twenty to fifty cents an inch. The force with which the stream issues from the nozzle of the hose is so great that it would kill a man instantly did it strike him.

There are at present more than five thousand miles of artificial watercourses in California for mining purposes. The average size of these ditches is eight feet wide at the top, six at the bottom, and three feet deep, with a grade of from twelve to eighteen feet to the mile. These flumes traverse the mountains in all directions, sometimes crossing ravines on the delicate yet strong trestle work that the Americans have brought to perfection. Along the Truckee ditch a flume eight miles long hangs on the side of a cañon. Of late iron pipes have been used; formerly all the flumes were of inch and a half planking. These ditches have cost in the neighbourhood twenty millions of dollars; and they have rendered mines available for working that would have remained untouched by pick or shovel to this day.

An inch of water in the mines is not a very well defined measurement, for the methods of delivering it differ in almost every camp. In many instances an opening, one inch high and twenty-four long, is made with a pressure of six inches, which would give twenty-four inches. So that here an inch of water is that quantity which passes through an aperture of a square

inch under a six-inch pressure. That would give 2,274 cubic feet in twenty-four hours. Now a cubic foot being nearly seven and a half gallons, it would be equal to 17,055 gallons in that time. In Eldorado county there is no pressure, but the aperture is three inches high and one wide. It will be obvious to all that the flow depends upon the pressure.

It is not easy to estimate the average cost of washing by the hydraulic process, as the nature of the material acted upon varies so considerably. The earth may be hard or soft, stubborn cement or loose gravel. With one pipe, of an inch and a half or two inches diameter, a boy can excavate and wash as much earth in one day as ten men. In some gravel claims the same force will wash as much as twenty men could do. At other places the strong cement has to be blasted before the hose is brought into play. In some claims one pipe will bring down as much material as three pipes will wash away, whilst others require three pipes to bring down that which one pipe can wash away. By washing away, I mean of course passing the loosened dirt through the sluice. Take for example a claim that uses 300 inches of water, and estimate, as is generally done, an inch of water to be equivalent to a supply of 145 lbs. a minute, or 8,700 lbs. an hour, then 300 inches will supply 15,000 tons in a day of twelve hours. It is calculated that the water removes one-fifth of its weight, which would give 3,000 tons of earth displaced daily, and that by two men, giving 1,500 tons to the man. The following calculation has been made of the relative expense of washing a cubic yard of gravel:—

By hand in the tin pan, about		$15·00
By the rocker . .	„	4·00
By the Long Tom .	„	1·00
By the sluice . .	„	·34
By hydraulic washing	„	·06

This includes the cost of the water. The Blue Gravel Company, at Smartsville, used more than seventeen millions of gallons to wash 980,000 cubic yards of gravel, and paid for water during forty-three months $57,261, paying at the rate of fifteen cents per inch, and the cubic yard of gravel costing less than six cents to wash. In the Middle Yuba district, where water is twenty cents, it costs seven and a half cents to mine a cubic yard.

Another branch of mining is sometimes practised on a large scale. This is called 'tail sluicing.' I think that I have before stated, that tailings are the earth, stones, and gravel that flow out of the sluice, and which, though treated as worthless, were always known to contain more or less gold. Now many companies working the same lode frequently unite to make a tail-race, which must have sufficient fall in order to carry of the refuse matter; whereupon another company gathers these tailings, and passes them through another course of sluicing. The following description of one of the largest of them will suffice for all. It is called the Teaff sluice, and is situated at Dutch Flat. The total length is 5,500 feet of this 2,500 feet are 5½ feet wide and 26 inches deep in a tunnel; the remaining 3,000 feet are 6 feet wide. It cost 55,000 dollars, and was four years making. Several companies deliver their tailings into it with an aggregate of 1,550 inches of water. The bottom is paved with boulders fourteen inches deep, and the incline is ten inches in twelve feet. The descent is broken at intervals of 120 feet by drops or dumps two feet and a half high in the tunnel and five feet outside. These serve to break up the masses of cemented pebbles and thus liberate the gold. The force of the current in this sluice is such that boulders of rock ten and fifteen inches and even twenty inches in diameter would be swept along at the rate of nearly ten miles an hour. This constant pounding and attrition of

the paved bottom of the sluice by the rolling rocks and gravel wear it away rapidly; this wear being as much as two inches in depth every three months, and half of the paving stones become broken so as to be unfit for use.

From fifteen to twenty pounds of quicksilver are put into the sluice every evening, but as the sluice continually catches that metal swept from the claims above, the owners are never obliged to buy any. They take out more than they put in.

Rock suitable for paving is also selected out of the boulders swept down from the other sluices. They are stopped by a strong iron grating placed across the mouth of the sluice in an inclined position. The spaces between the bars measure eight inches, so that only the largest boulders are excluded. A Chinaman standing by the grate examines every boulder that stops, and saves those suitable for pavement.

I had no means of ascertaining the earnings of this company but they are believed to be considerable, as a great deal of fine gold escapes from the claims above, and the company have comparatively little labour to perform, that being already done for them.

One hydraulic company, I was informed, washed 224,000 cubic feet of dirt in six days, using two hundred inches of water, and employing ten men. The wages of the men amounted, at four dollars a day each, to two hundred and forty dollars; the water cost three hundred dollars; the waste of quicksilver and sluice about a hundred dollars more, making a total expenditure of six hundred and fifty dollars. They cleared up 3,000 dollars. The dirt contained one cent and a fifth per cubic foot.

I should have mentioned that the amalgam of gold and quicksilver is retorted after it is taken from the sluice, and the quicksilver thereby saved after having been separated from the gold. Some miners less careful only

roast their amalgam in an open pan, and allow the fumes of the mercury to escape.

The action of quicksilver on gold is very curious. It does not mix with it like silver or copper, but as it were granulates it, separating the gold into minute particles, so that it crumbles to the touch and loses its malleability, which is never restored till the quicksilver is driven off by heat.

River mining was formerly much in favour in California. It is the most risky of all the styles of mining. The company either made a fortune or lost one, and being in the nature of gambling, and taking long odds, suited the Californian miner exactly. It is impossible to prospect a river other than on its banks. The only guide is the geological formation. For example a river rushes through a narrow gorge, and on emerging spreads out to more than its usual breadth. Here one may reasonably expect to find gold, which has been brought down as through a sluice. Again; a ridge of rocks crosses the river, or rather the river flows over them. They form in fact a natural riffle, and it can easily be supposed that gold will be found in the crevices above and below them. In another place the water, after passing through a series of rapids, forms a bank of sand, mud, and gravel, which it has washed down. This is called a bar, and is the pet speculation of the Californian miner. No sooner had one found a bar in a river than he forthwith gathered his chums together and imparted his discovery. They immediately sold their claims for what they would fetch, and set to work to turn the river. Everything conspires to throw difficulties in the way of river mining. It can only be done when the river is at its lowest. All the snow must be melted in the mountains. The work can hardly begin before June, and must be finished before September. They set to work

with a will. As many labourers as their means will allow are hired. From daybreak to sunset there is no cessation of labour. Slowly and surely the massive dam progresses. A wide ditch is cut if possible in the bank of the river. When, as is generally the case, the sides are too steep and rocky to allow of a canal being cut, a portion of the river must serve for that purpose. At length, in the middle of August, the dam is finished. The river flows by the side of its ancient bed to rejoin it about half a mile lower down. The bed of the stream is bare. The sluice boxes are laid along the centre. Prospecting with the pan is going on in holes and crevices. All hands are busy shovelling in the dirt. The sluice box, deftly made in the dam, is opened. For a week the water flows down the race—a week of hope and fear—a week the end of which will declare whether their labour and money have been spent in vain. That such is often the case the names of many tell. We meet with Poverty Bar, Last Chance, Greenhorn, &c. But, on the other hand, miners point exultingly to Yuba Dam, to Long Bar, and many others that have yielded millions. But supposing our bar turns out to be rich. Washing is neglected, unless the force is large, for the more important task of strengthening the dam against the floods of winter. For the rains will be on soon, and the springs will begin to rise. Very few dams withstand the winter torrents. They don't mind; they know that the gold is there; the claim remains their own, and next year they patiently recommence their labours, and so continue until the whole river bed is worked out. It is a strange sight these river beds with the huge boulders, and the crevices full of gravel, and pools of standing water, and little streamlets trickling about, for the bed is never quite dry; and there is a strange feeling of being below the level of the water, for over the dam you see the banked-up river, and have a

sense of danger. Suppose the dam should burst? Everywhere is motion and bustle, excepting on Sunday, for very few miners work on that day. Rough and sometimes dissolute as he is, the miner rarely works on the day of rest. When I have seen such they were foreigners, generally Frenchmen.

So it is that to-day engineering and mechanical skill have supplanted the old gold washing machines. From the hand washing pan (battea) of the Mexican and Indian came the rocker or cradle of the White man; that was improved to the Long Tom ending with the sluice and hydraulic power. And with these changes the nature of the mines is changed. There is no longer a scraping of the surface until what was called bed rock is reached; the whole surface of gulch and ravine and creek and flat is worked out, or at most so little left as to be deemed only worth working by the Chinese. A peculiar instance of how thoroughly the placer diggings have been worked is evidenced in Shaw's Flat, an exceedingly rich plateau in the county of Tuolumne. In 1851 this was a beautiful level park, studded with trees, among them many noble cedars. In 1860 the whole plain, from four to five miles across, was one scene of gaunt desolation. The entire dirt had been washed away, not a single tree remained. Shaw's Flat, once proverbial for the richness of its mines, was silent and solitary. The bed rock was composed of limestone. The head-waters of the river Stanislaus had been brought to bear upon the soil, and had washed every grain of it through Dragoon gulch into the lowlands. Nothing remained but the white bare rocks that looked like tombstones, the more so as they were of all shapes, some of them flat, others peaked, others needle-shaped, and some arched. A small town had sprung up during the brief and brilliant prosperity of that place, but not a sign of life was now seen in the cluster of wooden houses. They will stand there until some drunken traveller, either for mis-

chief or by negligence, will drop a lighted match against the dry walls and put the town out of its misery. A few ashes will mark the spot where the bar-room, the general store, the gambling-house and the Baptist chapel once stood. No one will miss them, and the fact of their destruction will hardly be mentioned in the local papers. Fortunes have been made here, but the face of the country is ruined for centuries.

At the foot of this table mountain flows Wood's Creek, of which mention has been already made. No creek in California has yielded so universally and been so rich as this. From its source in the mountains near Columbia to its junction with a tributary of the Stanislaus, it has been mined since the earliest days of California. Small towns have been built on its banks, and the busiest of a most mixed population have swarmed all over its bed. It is estimated that nearly equal to one year's production of all the mines of California has been taken out of this little creek and the gulches that run into it. It has given rise to the question absurd as it may appear: Does gold grow? For nine months of the year the bed of the river, its banks and gulches, are washed and scraped and sluiced and every pocket emptied. Down comes the rain, and the snows melt, and the gentle creek is swollen to the importance of a river. When the waters have subsided the gold is found in its wonted spots, not so rich as in the days of yore but still repaying the worker. A company has lately been formed to sluice the whole creek from one end to the other. It is urged that it is not yet half-worked out, that miners have never fairly gone down to the bed-rock, and so they are going to lay that bare also.

The working of theold river beds may be classed as a separate branch of mining. I have partially alluded to one of them when treating of the hydraulic washing, for

that Blue Lead referred to belongs to one of these, and its course has been traced for nearly a hundred miles, though it is only mined for a portion of its entire length on account of superposed mountains. Wherever it has shown itself a hue and cry has been raised, claims have been taken up, shafts sunk, tunnels bored into the mountains with drift ways seeking the continuation, every one animated with the hope of striking the hidden bed, certain of being rich the moment that he did so. All that was necessary was that a little bit of blue clay should come up in the bucket, and then the shout of Eureka would be raised, and the finder could either work it or sell out. Many miners prefer the latter, and then set to work again to find a further continuation of the mysterious stream.

But a still more striking phenomenon is presented by another of these primeval rivers. It is covered by what is called 'the dead table mountain.' It runs from near Silver Mountain in Alpine to Knight's Ferry in Tuolumne county, and there disappears. A stream of lava must have filled up the bed as well as the banks of this river, which at one side were precipitous. Ages of climatic action, or more active agencies, have worn away these old banks, and we have the spectacle of a black wall of basalt winding its way through the country in some places from three to eight hundred feet sheer down, in all parts difficult to scale. For seventy miles this type of a past mighty destruction pursues its serpentine course. Its flat surface is a mass of loose scoriæ, rendering it very difficult and painful for walking. Here and there, where a projecting crag has accumulated, a light soil may be seen, a hanging bush or scrub oak; but, in general, the burnt sides are utterly barren.

Under its feet, however, lies untold wealth, which these basaltic coffers render it very hard to get at. The old

lava stream covers a river rich in gold. The only way to reach it is by tunnelling. There is no mistaking the course of the river. It is there marked as plainly as though its waters were running to-day. The difficulty lies in striking the bed. If the miner goes too high he works continually in the hard volcanic formation, if too low he is tunnelling the bed-rock. The real bed is far below the present surface of the ground, so the workmen have first to sink a shaft, and then run drift ways until they find the old stream. It is a trying and expensive work. Some of the old banks are of solid rock, or of huge fragments of rock. To overcome this the miners to-day sink an incline so as to tap the river about the centre of its bed and then drift every way. Hundreds of thousands of dollars have been spent in these table mountain tunnels, but with few exceptions the experiment has not been successful, the expenses having been too great. This great wall built on the ruins of this dead river is ominous and black as one could fancy the Destroyer to be.

Another table mountain covering another river whose history belongs to geology, extends about seventy miles from Lassens Peak to Oroville. Others have been traced in different parts of the state. Wherever their beds could be worked, they have repaid the miner, showing conclusively one thing, that the gold formation is older than the upheaval of the Sierra Nevadas. In some of these beds are found rounded boulders of lava and basalt, proving that volcanic action existed whilst they were living streams, and that it was not one general eruption that dried up their sources for ever. The character of their beds also is different; that of the Big Blue Lead contains large quartz boulders, whilst that of San Juan is gravel, the pebbles not being larger than a small egg.

The like phenomenon was observed at an eruption of

Kilauea in the Sandwich Islands in 1859. The stream of lava came to a river which was winding its way to fertilise the plains below. For three days the lava battled with the snow-fed water and finally prevailed. The line of eruptive matter filled the bed of the river, and for some distance followed its course.

I will next draw attention to the quartz mines of California, her most enduring sources of wealth, and which are now receiving more particular attention and are being more rapidly developed in proportion as the placer mines are being worked out. The supply of quartz in this state is inexhaustible. The supply of gold-bearing quartz that will pay for working depends upon the cost of its extraction and crushing, as well as the nature of the machinery and processes employed. Some mines pay at ten dollars a ton, others lose with ore at thirty dollars a ton.

The elevation of quartz lodes is from two thousand to ten thousand feet above the level of the sea. Their course is the same as that of the dead rivers, namely from north-east to south-west. They crop out in all parts of the surface of the country, on the sides of hills, at the bottom of cañons, and in the valleys. Gold is found in large veins and small veins, in veins white as marble, and in others discoloured by the action of iron. Sometimes the gold is visible to the naked eye, sometimes the contrary; and yet this latter may be the richest ore. It is seldom that a vein continues rich for any considerable distance; there is invariably a fault or break, particularly if the vein have chimneys or pockets, which are spots in the vein where the ore is excessively rich. The richest part of a lode of auriferous quartz is always on the lower side of the vein near the foot-wall. The vein, if near the surface, is generally covered with loose fragments of disintegrated quartz. The miners usually wash and pound

up some of this, and if they don't find gold generally leave the vein alone. And yet there is nothing so dangerous as trusting to specimens. They may be worth thousands of dollars to the ton, and the mine bring in a loss in the working, whilst another lode of less pretensions will bring in an income for years. The most famous quartz mine in California for many years was called the Alison Ranch at Grass Valley. It was owned by a company of Irishmen, and for a year through gave out rock that yielded a hundred dollars to the ton. Now, when it is considered that the famous Mariposa Mines, formerly belonging to Colonel Fremont but now worked by a company, only yield rock worth fourteen dollars to the ton, and yet the income is $75,000 a month, it will be seen how rich the Alison mine must be. The partners disagreed some four or five years ago, and the mine was closed. It was re-opened this year, pumped out, and they are working it again. The Mariposa Mines have been continually the subject of a lawsuit, and have been grossly mismanaged; but it is said that some parties have grown rich out of the complications. The Eureka at Grass Valley is reputed to be the best managed mine in the state.

According to the official report there were in 1870, three hundred and thirty quartz mills in full operation in California. The number of tons crushed by them was 1,045,791, and they consumed 211,971 inches of water per day. This report cannot be absolutely relied upon as the millowners and miners are now very chary about giving information for fear of the tax-gatherer. One thing is certain, that the county of Nevada possesses one-fourth of all the mills in the fifty counties into which California is divided. Indeed it may be said that Amador, Calaveras, Eldorado, Mariposa, Nevada, Placer, and Tuolumne are the quartz mining counties.

Amador is the smallest county in the state but has

some famous mines in it, the most noted of which is the 'Hayward,' now incorporated with other mines, under the title of the Amador Mining Company. The history of this mine shows what pluck and perseverance will accomplish. About 1856 Alvinso Hayward commenced work on this lode, and for two years continued sinking shafts, erecting machinery, and following the course of the vein. The ore was poor, his funds were exhausted, but he was sure that he was on the right track, and would not be discouraged. He went to all his friends for he had many, and begged, borrowed, and scraped up all the money he could. All that went. His credit was exhausted. He could not even buy a pick. He had no money to pay his workmen, he was in arrear with them. One by one they withdrew, save one or two who were infected with their master's enthusiasm. He worked like one of them, suffered privations as they did, but still the mine yielded nothing. At length when worn out bodily and mentally, and almost on the point of giving up the mine in despair, he struck the main lode. Years had passed away in the meantime, but at length the reward had come. Of course all was now plain-sailing. Money is never wanting when money is in sight. In a short time Mr. Hayward's income was $50,000 a month. To-day he is worth millions, and has never forgotten those who stood by him in the dark days. Among these was a man of the name of Coleman, who had kept a huckster's shop at Amador. He had let Hayward have flour and provisions in limited quantities, for his means were limited, unto the end. Hayward invited him to San Francisco, obtained for him an agency for a large coal-oil establishment in the east, set him up in business with himself as partner, putting in $200,000 as capital, and the firm of Hayward and Coleman prospered exceedingly, the sole charge of the business being left to Coleman; who,

however, was seized with the demon of jealousy. He envied the luck, as he called it, of his partner, forgetting that that luck was his fortune. Everything that Hayward touched turned to gold. He was a large shareholder in the Bank of California. In 1868 the land fever was at its height in San Francisco, and Hayward made a great deal of money by buying and selling real estate. He also made bold ventures in mining stocks, carrying all before him by the sheer weight of capital. Coleman would do likewise, but he had neither the weight nor the acumen of his partner. He went on the Stock Exchange. The consequence was that, at the end of a year, everything was gone and he was $300,000 behindhand. In one day he sold all his stock at a sacrifice, and this was the first intimation that his partner had of his loss. The notes of the firm were out to the amount of the deficiency, and the solvent partner had to pay them. Coleman has now gone into the interior.

The Amador mine is a continuous vein, yielding a regular grade of ore of little more than twenty-one dollars to the ton. This is considered the best species of rock as it goes on in the same way for years. The mine is 1,850 feet long, and the vein of quartz is enclosed on the east by a wall of granite, and on the west by one of slate. The product for the year 1869–70 was $617,542, and the mill contains seventy-two stamps.

The opening out of this mine caused several other companies to work the continuation of the vein, and some three or four are doing so with the like success that crowned the labours of Mr. Hayward; so that he indirectly benefited the country at the same time he enriched himself.

The mines of Nevada county are chiefly indebted to the famous Grass Valley district for their reputation. Grass Valley was the first to be worked for its quartz

mines, and many an English company suffered in the early days of ignorance. It is still at the top of the tree, and still the region where the English most resort. The nucleus of the miners is composed of Cornishmen, the best underground miners in the world, but the hardest men to manage, as the recent strike, which has diminished last year's returns one-half, fully proves.

The system of mining here is called 'the Grass Valley system,' which is acknowledged to be the most perfect at present in use. I will endeavour to give a short explanation of it. They have been fifteen years bringing it to its present state of completeness.

Formerly the amalgamation was formed in the battery, that is, the quicksilver was added to the quartz whilst it was being crushed to a powder, but in this process amalgamation is not practised in battery, but the quartz is crushed to such a fineness as to permit its passage through the finest screens, and thence over blankets which are washed out every fifteen minutes. These blanket washings are passed through two very simple amalgamators, where a revolving cylinder with rakes stirs the mass in a bed of mercury. The skimmings of the amalgamating boxes are now treated with chemicals, and here one-third of the gross yield is obtained. The pulp from blankets and amalgamators has, in the meantime, passed through two simple contrivances called 'rubbers,' where further amalgamation is produced by washing and grinding cylinders covered with amalgamated copper plates (plates coated with quicksilver), which are moved horizontally by vibrating arms; thence through sluice-boxes with riffles of quicksilver to a discharge-box with self-acting gates, which is situated immediately over the concentrating room. Here commences the separation of the sulphurets which, still mixed with the sand and water, now flow through a concentrator eighteen feet in diameter. This

apparatus is an improvement on the 'buddle' used in the tin mines of Cornwall, and is well-adapted to California mining. The sulphurets settle on the outer rim of the concentrator, while the sand, water, and such fine particles as have not been caught, pass off through the centre to the tailpiece of the mill beyond. As a matter of precaution the sulphurets are passed through the buddle. They are then placed in a 'tossing tub,' another Cornish appliance, and here a further separation takes place. A stream of water is turned on with the charge in the tub, and a four-pound hammer striking forcibly and rapidly on the sides of the tub by its vibrations causes the heavier particles to sink and settle while the lighter pass off the edge of the tub to the tail-sluice. The sulphurets are now ready for chlorination. The tail-sluice of the mill has received all the refuse, and still further precautions are used to prevent the escape of any of the precious particles. The sluice, more than one hundred feet long, is divided into three sections, one of which is cleaned while the tailings are passing over the other two, where the heavier sands are caught by riffles, and submitted to the manipulations of a 'hooking trough.' Thus the last sulphurets are caught, and the tailings leave the ground of the company. I am indebted for the above, to a description of the mill of the Idaho mine, Grass Valley, furnished by Mr. W. A. Skidmore of San Francisco.

This Idaho mine is an extension of the famous Eureka, which is chiefly owned by two brothers of the name of Watt. They are Scotch, and have been in Grass Valley almost from the beginning, having originally had charge of the machinery of a quartz mill. The original length of the Eureka lode was 1,680 feet, but by purchase of an adjoining claim it is increased to 3,680 feet. The old Eureka yielded in 1869 $361,211 net profits to its owners. 1870 must not be taken into account, as it was

the year of the miners' strike. There is a mournful history in connection with this mine. The original owner, after working it without success, and having exhausted all his money, was obliged to abandon it. He came to San Francisco, where he lived in indigence for some time, finally cutting his wife's throat and those of his two children, and then blowing out his own brains. Those who re-opened the mine struck the ledge only twelve feet beyond the spot where the poor fellow had ceased working. He and his family are in the grave, whilst of the present owners one is state senator and the other state controller.

Various experiments have been made, and many different apparatus tried, for saving the finest particles of gold which escape in the common stamp process and pass off in the tailings. The following method by Mr. James T. M'Dougall, of Grass Valley, may be interesting. Mr. M'Dougall is engaged on the waste tailings of the Eureka and Idaho mines above-mentioned.

The contrivance consists of twelve troughs, each twelve feet by two and a half, inclined at a slight angle. The bottom of the troughs, or sluice boxes, are covered with copper plates amalgamated, and thickly studded with square iron pegs, about four inches in height and half an inch square. Over these pegs are placed closely-fitting copper caps, their outer surface being amalgamated, and arranged in such a manner that a corner is presented to the stream. In other words the diagonal of the pegs and caps is parallel with the sides of the sluice-box. The waste water from the Eureka and Idaho, from which the owners have extracted all the gold that they possibly could with their blankets, copper plates, rubbers, amalgamated pans, &c., is turned through the troughs I have described. Striking against the pegs, of which the troughs contain 5,000, the water boils and surges and

eddies about, so that every atom comes in contact with the amalgamated surfaces. The precipitation of the gold is greatly increased by the electrical action induced by the difference in latent heat between the different metals, copper, iron, and quicksilver. Amalgam forms rapidly, and two men are constantly employed in cleaning the copper caps and plates. Owing to the almost microscopical fineness of the gold particles thus saved, the amalgam obtained does not contain as much gold to the ounce as that ordinarily obtained at the quartz mills. This of course is to be expected. Mr. M'Dougall can tell at once what grade of ore is being worked in the mill above him. When they are running what they call poor rock his contrivance saves the most gold; when they are crushing rich rock his contrivance does not do so well. The reason is, that their rock which they call poor may in reality contain as much gold as that which they style rich, only it is in much finer particles and more diffused throughout the entire metal. The particles are so fine that the mill process cannot arrest them. In the rich rock the gold is coarser and they save it. The calculation is, that on an average ten per cent. of the gold passes away even when the rock is treated by the best known process.

The principal mines in Grass Valley are the Eureka, Empire, Idaho, North Star, Union Hill, Wisconsin, Hartery, Perrin's, M'Cauley's, Gold Hill, and Laremer's, and these yielded nearly two million dollars in 1869.

Grass Valley is the most thriving little town in California. It is prettily situated in a hollow, the sides of which were formerly covered with fine trees, which have all disappeared for fuel and buildings; but now the young trees are growing up, the place does not look so barren, but still the ugly stumps meet one everywhere. The neighbouring town of Nevada is a large

business centre surrounded by mines. It is in contemplation to build a narrow gauge railroad from Grass Valley and Nevada to a point on the Central Pacific. By this means a great quantity of the ore and sulphurets that cannot be profitably treated at Grass Valley may be shipped east or to Europe, and the gold be there extracted. These sulphurets abound in Grass Valley and all contain gold; but they are impracticable to quicksilver, and cannot be worked there. The furnace must do that which water and mercury fail to effect, and it is only in Europe that such appliances are to be found. They would not pay in California.

The description of one series of quartz mines is the description of all. Wherever they are carefully and economically worked they have proved an income, if not a fortune, to their owners. The development of them is yet in its infancy, and districts as yet unknown may rival the Grass Valley district.

MINES IN THE STATE OF NEVADA.

No mining districts on the Pacific slope have of late years excited more attention than those of the state of Nevada, particularly the mines of the famous Comstock lode and White Pine, both of these sections of country having rich silver mines in contradistinction to the gold fields of California.

The Comstock Lode has up to this time been traced more than twenty thousand feet, or nearly four miles. It runs nearly due north and south, and is popularly divided into three portions, the northern, the middle, and the southern; or, as others style it, the Ophir, the Virginia, and the Gold Hill. On these two latter portions stand the towns of Virginia and Gold Hill; literally stand on them, for the tunnels and drifts run under the towns, sometimes with so thin a separation that, as happened in Virginia City, two or three houses and a church paid a visit to the depths of the Gould and Curry mine, or at least went part of the way down.

The northern or Ophir division extends from the Utah to the Chollar Potosi mine, a length of 12,170 feet, and was the portion first worked, it being there that the first rich ore was discovered. This portion contains four distinctly separate bodies of ore, or chimneys as they are sometimes called, on all of which work is still going on. The first body north contains ore of a low grade running from three to fifteen dollars a ton. There are thousands of tons uncovered and unworked in this body. The Sierra Nevada is the principal mine in it. In the next of

the four bodies we come upon the rich Ophir mine, which yielded in former times immense quantities of good ore. The upper levels of this mine are nearly exhausted and deeper shafts have not warranted their continuance. When this mine was first worked, the great width of the vein rendered it necessary to leave massive pillars of rich ore, to prevent the chance of the mine caving in. These pillars are now being worked. In fact the whole of that portion of the mine is being cleaned up. The southern portion of this second body has hardly been worked as yet. It appears to contain a large body of ore but of comparatively low grade with that of its neighbour. It will come in some day. The third body contains the famed Gould and Curry mine: which dethroned the Ophir from its place as king of the Comstock lode. Savage and Hale and Norcross, all in this same body, are silver princes, and these three have yielded nearly fifteen millions of dollars. For the present they are nearly exhausted, unless a body of fresh ore is struck in the lower levels which are now being sunk. It is natural that some check should occur, as the daily extraction of ore for the last eight years has been at the rate of 650 tons.

These three mines are down about a thousand feet, and lately two of them, the Hale and Norcross and Savage, have struck a fresh body of ore of considerable extent, but not of such good quality as in the upper levels, being mixed with baser metal.

The fourth body contains the Chollar Potosi mine which is sunk to a depth of 1,220 feet below the surface, where the owners found no encouragement to go deeper. The mine is a fair, not rich mine, with ore worth from sixteen to thirty dollars a ton, the low grade ore preponderating. This failure in the deep levels has led to more careful exploration of those nearer the surface, and

in almost every instance bodies of ore have been found that had been neglected or overlooked in the eagerness to penetrate the unknown depths.

Next comes the middle or Virginia lode, containing the Bullion, Exchequer, Alpha, Treglone, and Imperial North. These have all been respectable mines, but are now, according to present appearances, worked out. They are now mining back ground, and occasionally a body of ore is met with which gives a temporary flash of excitement that soon subsides. They are all of them groping away at their lower levels from 1,000 to 1,400 feet deep, but without much success.

I will leave them, and turning sharp round the base of Mount Davidson come to the Southern or Gold Hill mines, the rich, irregular, coquettish, delusive mines of Gold Hill. More speculation in shares and more fortunes have been made and lost in these mines than in any of the others. Yellow Jacket, Crown Point, and Kentuck were supposed to be under the control of the Bank of California. The bank made all the advances for working them, and in return they were obliged to ship all their bullion through the bank. That joint stock corporation having a majority of votes could elect what officers it pleased for these mines, could control reports about ore, had first news of any rich strike; in fact, had information that enabled it to buy or sell according to its judgment. Then came one morning a telegram, 'The Yellow Jacket is on fire,' followed by other telegrams: 'The fire has extended to the Crown Point and Kentuck.' There was great loss of life in the lower levels, as they were cut off by the fire which commenced in the third level.

At the date of the fire (April 7, 1869) Yellow Jacket had 5,000 tons of twenty-seven dollar ore exposed on its nine hundred foot level. Kentuck had 12,000 tons of

thirty dollar ore exposed between the seven and nine hundred feet level; but the fire, which a year after was only partially extinct, has destroyed the timber work and caused the caving of much of the partially worked ground between the six and nine hundred feet levels, especially in the Kentuck mine. It is only with great difficulty and the utmost care that work can be carried on in the neighbourhood of the burnt and charred mass of timbers; the suspension of artificial ventilation, by the shafts being choked up, leaving the workmen to labour in an atmosphere pregnant with carbonic oxide, and innumerable obstacles of all sorts cause work to proceed very slowly. These troubles over, there is still a large body of rich ore, averaging thirty dollars to the ton, to be worked, and Yellow Jacket has lately discovered a new body of ore having no communication with others, and showing a different quality of rock with a considerable intermixture of baser metals. The Crown Point has gone deeper than any of the Gold Hill mines, but at its 1,100 feet level came to hot water, 120° Fahrenheit, which is regarded as a sure indication of poor ore. This fact was proved in the North Ophir, where the workmen came to hot water at a depth of 562 feet, and thereafter found nothing but limestone and iron pyrites.

All the observed phenomena tend to indicate that the present deepest workings of the Comstock lode are in a comparatively barren zone of the vein, which seems moreover to be characterised by a change in the gangue, from predominant quartz to predominant carbonate and sulphate of lime. The appearance of limestone in the vein may be connected directly with a change in its metalliferous character. It is quite a common phenomenon to find the zone between two sorts of gangue to be comparatively barren, but this appearance need not discourage the expectation of finding new metalliferous deposits under it.

The barren zone, now penetrated by the deeper workings on the Comstock, is either one of transition, or one of temporary variation. The quartzose gangue has by no means disappeared. It only threatens to do so, or at least to become permanently subordinate. The line on the other hand threatens to become permanently predominant, and has thus far proved unfavourable to the occurrence of ore in the forms and combinations hitherto characteristic of the vein. In this mixed condition of things, the vein matter being neither one thing nor the other, it is not surprising that the portion of ore has so greatly diminished. Indeed I may say, for the purpose of illustration, that the calcareous minerals are, as it were, themselves playing the part of ore to the quartz.

Therefore we may reasonably expect one of two things: either the unpleasant mixture of lime will prove to be local and temporary, and the vein will resume again in depth its original matrix, or the change now threatened will continue until the carbonate and sulphate of lime are permanently predominant as gangue.

In the former case the chances are in favour of a briefer continuance of the barren interval and of a subsequent recurrence of ore-bodies similar in character and distribution to those already exploited. In favour of this supposition, we have the universal prevalence of quartz as a vein material through the silver-bearing regions, and the comparatively infrequent appearances in large quantities, under such conditions, of the carbonate or sulphate of lime. Moreover there has not been observed, so far as I know, any decided change in the country rock, such as might be expected (though not of absolute necessity) to herald or accompany a complete change in gangue. There is some encouragement for this view, in the fact that in mines lying a mile and a half and two miles east of the Comstock, the veins contain in their southern portion

heavy layers of lime rock, which yield in depth to quartz.

In case of the complete change of the gangue and the permanent prevalence of lime, the character of the ores and the manner of their distribution would probably suffer a complete change also. To carry out my former illustration I will say, that the ores in depth would have to bear the same relation to lime that the present ores bear to quartz. This relation science cannot now actually determine. It is surmised to be partly chemical, partly electrical and partly mechanical; and it is certainly dependent also upon the manner in which the vein fissure was filled as well as the succession and relative duration of the different entrances of vein-matter. The nature of the ore that might be expected on a lime gangue on the Comstock, is however practically indicated by the modifications already observed in those parts of the vein where lime forms a considerable portion of the gangue; and judging from that we may expect more widely disseminated ore of lower grade, containing more base metal, and more difficult of treatment than has in general been hitherto the case.

I am indebted for the above as well as for much valuable information to the able report on Mines and Mining by Professor Rossiter W. Raymond, editor of the 'Engineering and Mining Journal,' New York.

I may as well mention here that the *gangue* is the mineral or earthy substance inclosing the metallic ore in the vein, and *country rock* is the rock of which all the surrounding strata to the vein is composed, for a vein is a foreign substance injected into the country or native rock, so that whenever the country rock is reached the vein with its walls, &c. ceases, and the mine exists no longer.

At the end of October, 1871, the company had penetrated 2,450 feet, chiefly through hard porphyry.

Their progress is consequently slow, not exceeding three feet daily. They are consequently expecting to tap some cross vein, and of late indications of the neighbourhood of such have been met with. The moment they come upon a body of ore, it is not improbable that the discovery will be rich enough to finish the tunnel, and when they arrive at the Comstock lode, the tunnel will be from five to twelve hundred feet below the present mines, and thereby effectually drain them which is the great desideratum. By Act of Congress all mines benefited by the Sutro tunnel are to pay a royalty of two dollars a ton to the company. Congress also granted an area of land at the mouth of the tunnel, containing one thousand two hundred and eighty acres, which, after the completion of the tunnel, will be the site of a town, as sufficient water will flow out of the cutting to supply mills for crushing the ore.

The tunnel will be fourteen feet wide by twelve high, and will have a double track railroad to run the cars in and out. The cars will carry five tons, and be drawn by a wire rope, worked by a stationary engine at the tunnel's mouth. The whole work will be finished in about two years, and the cost will be three millions of dollars. This undertaking if carried out will be most interesting in a geological point of view, and will effectually determine the question as to the nature of the Comstock lode two thousand feet below the surface. That this great fissure does extend deep into the bowels of the earth no one doubts, and human ingenuity cannot pierce its depths; at the same time the Sutro tunnel will prospect sufficiently to enable the miner to judge whether he is warranted in sinking deeper or working up from the tunnel to connect with his shaft overhead.

I incline to think that the palmy days of the Comstock are over. So much of vein as has been worked displayed

on its surface a width varying from 200 to 800 feet, but in its downward course the walls approach one another, until in some places they almost unite, a thin layer of clay only remaining between them. Chimneys, however, are found to exist here and there which may communicate with the mysterious subterranean source of the vein itself, if, as many do, we take these chimneys to be the vent through which the matter forming the ledge was forced up during the period of volcanic activity which produced it.

After all the Comstock lode has done its duty in contributing to the wealth of nations. For nine years it has averaged a yearly production of more than eleven millions of dollars. The Ophir group has given ten millions; the Gould and Curry constellation fifty millions, and Gold Hill forty-five millions of dollars. This has been drawn from less than one-fourth of the actual face of the lode, being all that, under present costs of working, would give a profit. With increased facilities, an immense body of low grade ore, ranging from eight to twelve dollars to the ton, would be brought into play. The first step to reduction in charges has been taken by the mills themselves. They have considerably lowered the price of crushing. The second step is in a more perfect manipulation of the ores. At present the loss is fully twenty-five per cent. The third desideratum is railroad communication with the outside world. The last has been inaugurated by the construction of the first section of the Virginia and Truckee Railroad, eighteen miles from Virginia to the Carson river. There is no water at the Comstock, and almost all the mills for crushing the ore are on that river. Formerly the ore had to be carted along the rough roads at great expense from the mine to the mill. Now it is dumped into the train of waggons, and carried to its destination at one quarter the expense. It is esti-

mated that the saving this year in the reduction of Washoe ores will be fully fifty per cent. The projected narrow gauge line from Virginia to Reno on the Central Pacific, will be a glorious thing for the Comstock, and it will be finished ere long. Not only is the freight of ore lessened from the mine to the mill, but the freight of lumber, &c., from Carson to Virginia, is reduced. The lumber comes from beyond the river, as there is not, nor ever was, a stick in the barren country that surrounds the Comstock lode.

The Sutro tunnel is one of those gigantic schemes that only a valuable prize like the Comstock could inspire. This tunnel commences at a point some nineteen thousand feet from the line of outcroppings of the Comstock.

There are other mines outside the Comstock which under careful management and reduced rates for crushing will pay very well. Such is the Flowery district in the low lands west of the great lode, which has twelve to fifteen dollar ores. In this mine the principal matrix is quartz; whilst in the Occidental, more to the south, lime predominates.

Some three miles south from Gold Hill is Devil's Gate, a remarkable cleft in the trap rock, through which the road passes. Here some mines have been unprofitably worked. Silver City is about half a mile further on, and near here is the Daney mine, which, at one time, was in great favour on the Stock Exchange, but has fallen away considerably of late although it is still worked, and now and then gives out fitful signs of life. The Julia is a humble dependent of this mine, and follows the fortunes of the Daney. Its principal occupation for the last two years has been levying assessments, and the chief occupation of the secretary, advertising the shares as delinquent.

Such is a brief description of the great Comstock lode as it is to-day, but how different from the scene in former

days. In 1857 mysterious parties were seen going along the Truckee and through the peaceful agricultural village of Carson, where rough Western men congregated of an evening or on Sundays to read the newspapers, talk politics, and drink whiskey. These parties all directed their steps to the foot of the peak of Mount Davidson, which rises in isolated grandeur and barrenness above the surrounding hills. They were not farmers or they wouldn't go to that bleak waste, where only one or two streams painfully trickled over the bare stones. They were not miners exactly, for there were city faces among them, witness Mr. Donald Davidson, after whom the hill was named, and who, spite of his sixty winters, was the first to scale its steep sides and plant a staff on the spot, and the broad cloth of Judge H. was ill-adapted for the mountains. However, the next year, the mystery was solved. Some Mexicans, who owned the only spring of water, sold it to a company for a strip of mining land they themselves selected, and which was portion of a large district taken up by the company. These same Mexicans had previously helped the company to sink prospecting shafts and generally develope the lode. So it was, that simultaneously the Ophir and the Mexican mines were opened. The Mexicans, with that knowledge of indications that seems almost inherent to them, had the richest strip of the whole section, and very soon began to turn out the most beautiful specimens of silver ore—a greyish purple rock, fairly bursting with silver, and very heavy in the hand. Of course the thing could not long be kept a secret. Machinery and lumber had to be transported over the Sierra Nevadas. A road had to be made, workmen had to be transported. Ore was sent to San Francisco to be essayed, and very soon the excitement began. The railroad to Folsom was one stream of cars, carrying passengers, goods, tools, and machinery.

The station resembled the camp of a great army. The road to Placerville was crowded with pedestrians, equestrians, and travellers by cart or coach. Thence they diverged, each seeking his way to Washoe by his favourite pass. Some going by the Douner pass, these, by the way, having come through the city of Nevada in California. Others went through the beautiful Strawberry Valley, which is a miniature Yosemité, along the shore of Lake Tahoe, down the steep Geiger grade, through Carson city, and up to the land of promise. The lines from Placerville and Nevada city being opposition, the stagecoaches used to race all the way, one by the Douner pass, and the other by the Carson pass. A crowd would assemble to witness their arrival, and although each had travelled some hundred and odd miles over the Nevadas, they usually came in, in ordinary weather, within half an hour of one another. The line from Nevada in California was the best in winter. It crossed the north fork of the Yuba, and for about fifty miles the road was one of great beauty, but awfully dangerous, owing to the way they galloped down the steep grades. The pass through the Sierras was very grand, after which Douner Lake was reached, and then full gallop as fast as the horses could tear along the banks of the winding Truckee for about twelve miles, when a long plain, evidently formerly the bed of a lake, stretches to Steam-boat Springs, where a tedious winding road of seven miles is ascended at a walk, and the traveller is seven thousand feet above the level of the sea. Thence he rushes down a thousand feet to Virginia City.

1860-61 saw this town in its palmy days. Shares of impracticable mines, in impossible places, found eager buyers. Wherever an outcrop of foreign rock appeared, the claim was taken up, so that poor old storm-beaten Mount Davidson was covered over with notices of claims,

and looked from the town like a woman's head in curl-papers. The Comstock lode had been taken up long before, in many instances more than once, and the lawyers flocked to a feast of litigation. The Ophir, Gould, and Curry were yielding millions. The Mexican mine had been bought by a New York capitalist. The superintendent of the Gould and Curry built himself a splendid house, magnificently furnished, and gave parties every day. The superintendent of the Ophir, who had 5,000 dollars a month, drove his four horses in from the works, eight miles distant, daily to the mine. Nothing but champagne of the best brands, and that in inconceivable quantities, could reconcile men to live six thousand feet above the level of the sea, in the most bleak and arid country, away from everywhere, exposed to Indian attacks, and fever, and ague, and rheumatism, brought on by bad water, and those gentle gales that cut your face with the gravel they bring along with them, and which were facetiously baptized 'Washoe Zephyrs.' Gold Hill, which was at first not supposed to be on the Comstock, was beginning to become a power, spite of the varying character of its ores. All was the intoxication of sudden wealth. Bar-rooms abounded, but there was not much gambling, I should say card-playing, for daily life was the fiercest sort of gambling.

Wild as it is, and treeless and bleak as is the country, the view from the line of the Comstock ledge looking east is awfully grand, especially when the setting sun falls on the high mountains in Humboldt county. A thousand feet or more below you stretches what appears to be a valley, but what is, in reality, a more gentle grade of the elevation you are standing upon. Miles away and the mountains begin to rise again, and they pile and pile upon one another, all of a clear purple, until the eye looks over them into space. For the air is

so rarefied there, and the country so utterly devoid of water, that the atmosphere is as clear as glass, so tha there is no dim horizon. You see as far as the conformation of the earth will allow, and then earth turns over and the pure ether remains beyond. An immense expanse of the globe's hardest surface is before you.

At that time Ophir was $5000 a share, Gould and Curry one-third more. Enormous dividends were being paid; great fortunes were amassed, and yet of all those who flourished and revelled and lavished their money like water, very few indeed have any of it left. They didn't know when to leave off. When the mines began to grow less rich, and dividends began to diminish, nay when even the ominous word assessment began to be whispered, they would not take warning and realise. They stuck to the ship and have gone down with her. Many of them hypothecated their stock for half its value, in order to buy more in that or in other mines; the consequence was, that when the fall came their stock was all sold, for San Francisco money-lenders know nothing about prospects, have nothing sanguine in their temperaments, nor any feeling in their hearts. They look at the market value and act accordingly.

To-day Ophir is $23 and levying assessments, and Gould and Curry $105, neither of them having paid any dividends for some years.

WHITE PINE MINES.

I HAVE already incidentally mentioned the White Pine district. Next to the mines of the Comstock, those of White Pine have attracted the greatest attention of late years. All the signs and indications of the Comstock fail in this district as the majority of the deposits are connected with the stratification of the limestone. So far no deep fissure veins have been discovered, and the ore is found in layers, up to two hundred feet in width. In one respect only the ore of White Pine resembles that of the Comstock. It is silver, but there the resemblance stops. The whole of Treasure Hill is limestone, but mixed and jumbled up with broken fragments of slate, brecchia, or angular fragments of silicified limestone, cemented together with calc spar, which latter generally fills up all the interstices, but which, as it does not contain any silver, is probably the latest infiltration. The silver ore is generally in the form of a chloride, but frequently as a sulphuret, and is even found as native silver incrusting the brecchia, penetrating the crevices in threads and films, as well as aggregated here and there in chambers or pockets. And although the occurrence of rich bodies of ore, like those of the Eberhardt mine, is not frequent, yet the White Pine limestone is a favourable matrix for such, and they may be found at any time or place where cavities large enough to contain them have been formed by the disintegration or solution or erosion of the rock, and where the metalliferous fluids have had sufficient access.

The ore is spread so irregularly in the White Pine Mines, that it is not astonishing that more than ten thousand claims are recorded as having been located, claims which yield from a few hundred pounds of ore per month up to those which give thirty or forty tons a day. The whole district embraces an area of about twelve square miles, and the principal towns are Hamilton, the county seat, Treasure City, and Sherman, containing respectively 5000, 4000, and 2000 inhabitants; add to this about four thousand scattered about on the hills, and we have about 15,000 as the floating population of this part of Nevada. The principal mines are at the top of Treasure Hill, White Pine Mountains. This is a broad range, consisting sometimes of two or three parallel ridges, at one place close together, at another far apart. The summits of the two nearest ridges of White Pine Mines are five miles apart. Between these two summits rises Treasure Hill, 1,500 feet from its immediate base, but 10,000 feet above the level of the sea. Its base from north to south extends three miles, from east to west only one mile. The summit is a narrow ridge from north to south, a mile and a half long, terminating sharply at its southern end by a clear cut of precipitous descent; at the north it is very steep, but not so sheer down to the base. The body of the mountain, as I said before, is composed of limestone strata, which was originally horizontal, but was subsequently lifted, so that the strata now slope at an angle of 30° toward the west. The east end consequently presents all the jagged ends of these strata so upheaved. It is among these croppings that the mine called Hidden Treasure is situated, the Emersley also and the Pocotillo, all of them magnates in the market.

At the same time this upheaval of the limestone beds was not gradual nor even. Marks of resistance appear

on the western slope, and fractured lines and long abrasions of the parent bed. The upheaving force was unequal, so that where the greatest effort was made the rock is lifted higher, and the separated part has fallen under it as under a towering cliff. And all along the edges of these broken prostrate ledges are the signs of the grating and grinding of the rocks, impotent to resist the Plutonic force that raised them from their level. At the south end of this western slope there is one of these broken ledges forming a spur pointing heavenwards, and the fractured part almost retaining its original level. Here is the *Eberhardt*, lower down are the California, Mazeppa, &c., and here centres the richness of the White Pine Mines.

In another part of the west side is a ledge that has not been much acted upon by subterranean forces, and in consequence has not only preserved its lateral character, but any inequality arising from partial disturbance has been filled up by the erosion of the strata above. This strata is unequal in its hardness, and being continually exposed to the action of the elements is consequently constantly loosened and carried down by the heavy rains or melting snows, and lodged upon this plateau, forming what is called Pogoniss Flat. I must here explain that the word Pogoniss means in Indian one of those mild zephyrs before referred to, where, unless your hair is strongly rooted, you are liable to become bald on turning a corner; one of those gentle gales that leave no trace behind them of the swooped-up property, be it shanty or tent, save the place where it stood; in short, a White Pine hurricane, which blows about as often as it rains in England. However, on this flat, underground and away from the captivating zephyr, men are mining in the Pogoniss, Othello, and Glacier mines. Round the corner is another flat called Chloride Flat, and again Bromide

and Bonner Flats. This last is called after an English engineer of superior talents and integrity. He was engaged by all the great companies, but, alas! died in the height of his renown and prosperity.

At the south end, on the west side of the summit, close to Treasure City, in fact, partly in the town itself, is the Aurora consolidated mine, which was located about the same time as the Eberhardt, namely, in the autumn of 1867. After that comes the South Aurora, which has always been a popular mine. Shafts have been sunk along its entire length (800 feet), and mineral found for 400 feet without intermission. The Chloride Flat, before mentioned, has been taken up by a company, who have commenced work on a large scale. This company is backed and controlled by the Bank of California. It was found that the ore in this flat was deposited in horizontal strata, one overlying the other, separated only by sheets of limestone. The consequence is that the manner of working is extremely simple. A shaft is sunk, and when it strikes the layer of ore, drifts are run in all directions, and the mineral sent to the surface; when that is exhausted, the shaft again pierces the limestone until the miners' strike the silver ore again, when the process is repeated. There is a certain cake made in France, containing alternate layers of sponge cake and jam, which exactly elucidates this mine, if one may compare small things with great, the jam being the ore *bien entendu.* It is a rolly-poly chloride of silver pudding, done flat. This ore is very rich, sometimes assaying as high as $27,000 a ton. The deepest shaft is only 145 feet, and the shafts pierce the ground in all directions.

The California, another noted White Pine mine, is about a mile from the Eberhardt. It is very rich, both in chloride and bromide of silver, ranging from $300 to $1000 a ton in value. There are hosts of other mines,

but I will conclude with a description of the King Mine of the White Pine district.

At the south end of Treasure Hill, quite at its summit, an immense break runs east and west across the strata. A chasm, 200 feet wide, was opened there at some distant epoch. South of this chasm the ground is some 300 feet lower than at the northern side—is in fact comparatively level, forming a kind of shelf in the mountain. In this chasm and on this shelf nature has placed the Eberhardt mine. The whole chasm is filled with ore and gangue, the latter composed (as may be found in the lower levels of the Comstock) of limestone, quartz, and spar. The ore proper is very irregularly deposited, lying sometimes in horizontal sheets, at other times occurring in the shape of pockets of various sizes and forms. Large lumps of chloride of silver, weighing over a hundred pounds, are found so pure that a nail may easily be driven into any part of them, and a silver coin laid upon them and struck smartly with a hammer leaves its impression. While there is a large quantity of ore of this exceeding richness, there is a hundred fold more of the value of about a hundred dollars a ton, wherein, of course, lies the real profit. The Blue Belle shaft is one of the richest in the mine.

I mustn't leave out the Hidden Treasure however, for it has a romantic history, being shown to a compassionate blacksmith by a grateful Indian. When the Indian took him, and showed the rough, worn, and twisted outcroppings, the honest man was so bewildered with the formation, that he could not understand how to locate his claim, and was obliged to confide his secret to a practical miner. The deposit of ore is quite flat at the top, and then dips at an angle of forty-five degrees. This mine is full of horn silver, which is a nearly pure chloride. It is a good mine, and easily worked.

The following is the average value of the ore of the mines above-named.

Name of Mine.	Yield per ton.
Aurora	$92·25
Consolidated Chloride . . .	94·50
Eberhardt	390·0
Hidden Treasure	100·0
Mazeppa	307·0
California	150·0

The average value of the mines of any importance is about $98 a ton.

There are hundreds of mines scattered all over the district. There are the base metal range, the mines about Hamilton City, &c. In fact, it may be laid down as a general axiom, that from Salt Lake City to the great desert of the Colorado is one rich belt of silver ore. It extends from Washoe on the west to the land of the Mormons on the east, thence narrowing towards the range of the Humboldt Mountains it strikes that granite dyke of the North Colorado, which, with its wonderful cañon, cuts as it were the argentiferous belt only to allow it to appear again in the little-worked, but well-authenticated as to wealth, mines of New Mexico, called the San Diego Mines. These lie on the frontiers of Arizona and New Mexico, in the midst of hostile Indians; and, although the ore costs from sixty to seventy dollars per ton to send it from the mine to the river, yet it pays the owners to transport it even at that exceedingly high rate.

North of the White Pine district come the territories of Montana and Idaho, where the ore and deposits are gold, and which I have not visited.

QUICKSILVER, ETC.

THE mines of quicksilver are chiefly confined to three companies. The ore of quicksilver, as is well known, is called cinnabar, and rich specimens hold the mercury suspended in small globules. It is from this cinnabar that the brilliant vermilion is obtained. The ore itself is a sulphuret, and the process is, to drive off the sulphur with the fumes of the quicksilver, and then to allow the sulphur to escape and condense the mercury.

The principal mine is that of New Almaden in Santa Cruz county. It was formerly owned by the English house of Barron & Co., but after a prolonged and expensive lawsuit they were ejected by the United States Government, although they had been in undisturbed possession for many years. It is now the property of an American company. The production of quicksilver for the year 1869 was as follows:—

New Almaden. Flasks.	New Idria. Flasks.	Redington. Flasks.	Other Mines. Flasks.	Total. Flasks.
16,898	10,315	5,500	1,000	33,713

which, at 76½ lbs. to the flask, gives 2,579,044 lbs.

The yield of quicksilver for 1868 was 43,000 flasks, or 3,268,000 lbs. This difference of a million of pounds was caused as follows: In 1868 the New Almaden Mine was worked for the exclusive benefit of the shareholders, and consequently was driven to its utmost extent. At the end of that year, however, the Bank of California and Messrs. Barron made a contract for five years with the New Almaden Company, to take all their quicksilver

produced during that term at a certain price per flask. This being concluded, and they having the entire control of the market, advanced the price about three dollars a flask. The miners must come to them, quicksilver is as necessary as bread, but the New Almaden do not overwork themselves in the production.

Borax is obtained from a small lake of that name near Clear Lake. The water of this lake is strongly impregnated with borate of soda, and the divers bring up large crystals of borax nearly pure from the bottom. About four thousand cases are exported yearly, worth from twenty to twenty-five dollars a case.

There are many beds of asphaltum in the southern portion of the state. They are extensively worked for pavements, roofing, &c. Petroleum has likewise been found and exploited in a slight degree, but not with any great success.

AGRICULTURE IN CALIFORNIA.

AFTER the first fierce excitement of the mines had subsided, and the population of California was numbered by thousands, men began to reflect that there were other ways of getting gold out of the earth than washing gravel for it. Naturally the first application of labour in that direction was the cultivation of market gardens in the precincts of the large cities for the supply of the inhabitants. A small field, part of which is now a florist's garden and the remainder covered with handsome dwellings, was pointed out to me at the Mission Dolores, about three miles from San Francisco, the owner of which made a comfortable fortune in 1850–51 by cabbages alone. Another at Half Moon Bay cleared 10,000 dollars a year by his onions. Potatoes, both sweet and Irish, were imported from Honolulu; and flour, barley, and oats from the Eastern States, Chili, and Australia. Barley was more used for horse-feed than oats in those days, and the price frequently rose to eight cents a pound. The flour market was entirely in the hands of speculators, who now and then forestalled the market to such an extent, that the price rose in the mines to fifteen and twenty dollars the hundred pounds, costing in Chili from five to six dollars. Naturally the Western immigrants turned their attention to farming, and the fertile lands that line the eastern sides of the bay of San Francisco soon began to have their waving crops of grain. The only difficulty in

the way of settlers at that time was the title to the land. There were so many obscure, if not doubtful, Spanish titles, so many heirs, so many litigants that men hesitated about laying out their money in improvements. But the Vallejos, the Pachecos, and some others of the old Spanish families had held their own, or at least a portion of their leagues of land, and they farmed sections out on half shares; that is, a farmer took, say, a thousand acres, put in the seed, and gave half the crop to the owner of the soil. Various flour-mills sprang up all over the country. James Lick, who had made a fortune in real estate in San Francisco, built a mill the timber of which was mahogany, and which to-day turns out as good flour as any in the state. In the city of San Francisco three or four steam flour-mills were erected, the largest of which is now used as a brewery. The high price of labour and the want of land communication for a long time confined grain culture to the plains and valleys that border the bay or the navigable rivers, and the same reason enabled the millers of Chili to compete successfully with their Californian rivals.

The first shipment of flour and wheat was made to New York about 1856. It found little favour at first with the eastern and English millers, it was so hard and gritty that they could not grind it; but by degrees it began to be appreciated, as it was found that the grain yielded more flour, and the bakers discovered that this flour absorbed more water than any other in the working it. Consequently the demand increased, the millers altered their millstones to grind this dry hard wheat, and to-day California wheat ranks as high as any in the markets of the world. The following table will show the increase in the export of this article. It is taken from the circular of the leading corn-broker in San Francisco.

Export of California Wheat for the past Eleven Years from June to June.

	Wheat. 100 lb. sacks.	Flour. Barrels, 200 lbs.
1861 . . .	1,528,226	179,652
1862	775,553	82,601
1863	1,159,748	141,488
1864	984,941	158,225
1865	23,818	52,424
1866	1,044,826	249,857
1867	3,642,505	485,493
1868	3,773,002	426,157
1869	4,373,213	459,923
1870	4,864,590	354,106
1871	3,583,124	194,763

Thus it will be seen, that although there have been fluctuations consequent chiefly upon high prices in California, forbidding shipments, the export of California cereals in good years has been steadily on the increase. This year's shipments will show a great falling off. The season has been one of the driest ever known in the state, and coming on the heels of a past dry year, the effect on the farming interests has been most disastrous. Last year showed a deficiency in receipts over the year preceding of 1,900,000 dollars, notwithstanding a much larger breadth of land was put into grain than the year before; and this year, although more than a million of acres has been planted in wheat alone, which under favourable circumstances would have produced over and above the requirements of the country, a surplus for export of something like 600,000 tons, will barely leave 100,000 tons for that purpose.

Up to November 1869 no class of working-men in the world were in better condition than the agriculturists of California. They had had quite a succession of favourable seasons; they had realised good prices for their farm products of every description; they were not only free from debt, but had a large aggregate of realised capital

in hard coin lying in bank. It appeared as if farming in California was one of the most profitable avocations in the world, and so it was till the speculators came in, and a rush being made by those who were engaged in other pursuits as well as by those already engaged in farming to buy land, these speculators, having secured the most available lands, resold it to them at high prices, so that not only was all their spare money invested in the land, but a heavy residue remained in the shape of debt secured on the new purchase. The farmer became rich in acres, but poor in purse; his balance at his bankers was light, but his mortgage was heavy. Had the seasons continued favourable all might have been well, but, as it turned out, an immense amount of capital in the shape both of money and labour was invested in the purchase and cultivation of new lands which yielded nothing, and the farmer at present is poor. He is not, however, positively broken nor discouraged, and there is hardly a part of the state where one good crop will not put him in easy circumstances. The unfortunate part of this drought is, that it has fallen most severely on the San Joaquim Valley, where the great bulk of the newly purchased lands is situated, and the crop there is a total failure. The landowners and farmers, however, of that widely spread district have leagued together to secure themselves against future contingencies of this nature, by an entire change in their system of agriculture, especially by the construction of large irrigating canals. The geological formation of this as well as of other valleys in California is as if nature had formed them for the work of irrigation, and once the system completed, the product of wheat will be enormously increased, and the yield to a great extent independent of the seasons.

With all this bad year, California is not otherwise than prosperous. Suppose that she exports 100,000 tons of

wheat, that at two cents a pound, which is a fair price, will bring in 400,000 dollars. The wool clip this year under the present very high rates will produce at least 10,000,000 dollars. The wine and minor products will bring in 2,000,000 dollars more, so that the exports of the state will amount to 16,000,000 dollars, which is not so very bad for a young state of less than half-a-million of inhabitants, and after two years' drought. This is export only, be it remembered, and does not include the amount retained for home consumption.

Of the 160,000 square miles composing the area of California about one-third are arable, whereof about 16,000 are in the coast valleys, 30,000 in the lowlands of the Sacramento basin, 12,000 in the foot-hills and valleys of the Sierra Nevada, and 2,000 in the Klamath basin. The rest is desert and mountain. This amount of tillable land is equal to 40,000,000 acres, and hardly a million and a half acres are actually under cultivation for all purposes, including orchards, gardens, &c. It is true that a portion of this land, say one-fourth of it, is not so rich as the generality of land in this part of the world, and at present a large amount is too far removed from a market to render its cultivation profitable. This objection is being rapidly done away with by the network of railroads that are extending themselves all over the state. Another serious impediment, however, to farming in California is the insecurity of titles. Partly by fraud, partly by mortgage, almost the whole of the old Spanish grants have passed into the hands of the Americans. To-day innumerable claimants arise in the persons of the numberless descendants of these Mexicans, and it is not an unfrequent thing to see in an action to quiet title, one plaintiff and from a hundred and fifty to two hundred defendants; as, for instance, John Smith *v.* Jesus Maria Castro, Conception Castro, &c., and all the tribe of

Castros married and unmarried, their wives, their children, the collateral branches, all must be made parties to the suit, for if unfortunately a single defendant be omitted, then some sharp practitioner buys his claim, and forthwith commences an action for a two-hundredth undivided share of one-fifth of the whole estate, sometimes twenty leagues in extent, and thus a cloud is cast on the whole. Another drawback is, that all the best lands are now in the hands of the great capitalists and railroad corporations. The government price is a dollar and a quarter an acre, the purchaser not to pre-empt more than a hundred and sixty acres. But there are certain things called school-warrants, that is to say, so many sections out of every district are set apart by the Government for the purpose of being sold, and the produce applied for the support of the public schools. These warrants were all bought up and the lands *covered*, as the term is, with them. The consequence is, that the lowest price of land in the San Joaquim Valley is now five dollars an acre, and on the line of the railroad now constructing from Stockton it is from ten to thirty dollars, according to its distance from that town. It is true that land in Illinois, which originally cost a dollar and a quarter, now sells for forty dollars the acre; the fact is a drawback to immigration.

There are certain tablelands among the Sierras that are fertile and can be partially cultivated, owing to their proximity to mining towns. Such, for example, is the beautiful Honey Lake Valley, about sixty miles long and ten wide, at an elevation of 4,500 feet above the level of the sea. The valley is shut in by mountains, has little or no drainage, and in wet weather is rather swampy, but is a haven of refuge for cattle in a dry season.

The soil of the Sacramento Valley is a sandy loam mixed here and there with gravel. It is not so rich as other parts of California, besides being subject to

overflow, which instead of enriching the soil as elsewhere, has the contrary effect. The north part of the San Joaquim Valley is somewhat better, and towards the south, in the neighbourhood of Tulare Lake, very fertile land is found. I cannot resist inserting the following rapturous description of this spot, taken from a local paper.

'*Tulare Valley.*—There are one thousand sections of land in Tulare Valley, watered by four creeks, yielding a vegetation unsurpassed in Egypt, overflowed like the banks of the Nile, and as fertile as they are. The country is peopled by gentle savages, emulous of serving the Whites. These thousand sections are peculiarly different from most lands; there is not a stone to be found upon them —not a pebble—Indians here, women grown and men, have never seen a stone, but the far-fetched round-pounding stone of the squaws to grind their acorns with.

'Down from the Nevadas the water clear and cold comes from its birthplace of snows, and pursuing its course arrives at the valley of Tules, and spreads over its bosom for miles in a swamp, then issuing from the swamp by several high banked channels, irrigates the country in every direction; each of these channels again and again loses itself in swamps, and escapes from them by many rivulets, till the lonely Kaweah of the mountains is four creeks at Woodsville, ten creeks at Visalia, and debouches into Tulare Lake by a thousand little mouths, some above and some below ground, having in its checkered course bestowed wealth and fertility on unnumbered acres.'

If the above does not bring settlers and purchasers that way, then is fine writing wasted in vain. I may as well add in a postscript, that there is not a tree visible for miles and miles, not a blade of grass to be seen at this moment.

The gem of California, however, is Pajaro Valley. Its crops of grain are unsurpassed by any in the state. A field of one hundred acres in this valley produced 90,000 bushels of barley, and one acre of it yielded 149 bushels. Its potatoes are only excelled by those of Bodega on the coast of the Pacific. Suñol Valley is also very rich. The county of Santa Cruz is fertile throughout, rich in its alluvial plains, rich in its red wood forests, rich in its tan bark, rich in never-failing streams. It is a favourite resort for sea-bathing by invalids, as there are steamers between it and San Francisco, as well as a lovely ride over the mountains. Russian River Valley is, as a whole, the most productive in the entire state, not only on account of its great size, but also for its adaptability to grow anything, particularly maize. It produces more of this latter cereal than the whole of California together. This valley is also a great hog-raising district. The droves are turned, at the proper season, into the forests of oaks that abound in one portion of the valley; the hogs get very fat on the acorns, and Russian River hams and bacon command the first price in the market. Near the mouth of Russian River is Bodega plain, where the potatoes grow to an astonishing size. Russian River, I may mention, is called after a colony of that nation who settled there in the beginning of this century, and had they been properly seconded by their government the coinage of this country might have been the double-headed eagle to-day. It does not appear that these Russians were aware of the existence of the bay of San Francisco, but had landed at Sir Francis Drake's bay, and thence proceeded inland.

The numerous valleys formed by the spurs of the Monte Diablo range are very fertile, particularly San Ramon and Amador Valleys. In the south the river

San Gabriel sinks into the ground at a place called 'The Monte,' and after flowing underground for some two or three miles, reappears, the place where it sinks is continually moist, and the soil very good.

The principal kind of wheat cultivated here is the Chili, the next the Australian. A small quantity of Egyptian wheat is grown by the Italians for the manufacture of maccaroni, but three-fourths of the entire crop is grown from these two former. The quality of wheat varies very much in different parts of the state, but as a general rule Californian wheat may be passed as possessing considerable gluten, flintiness, plumpness, and weight.

The climate of California is peculiarly adapted for economical wheat culture. The farmer needs no barn, in many parts he has neither a fence nor a drain to make. A perambulating reaping machine goes from farm to farm of those whose acres or whose means are not enough to have their own. The crop is gathered into a heap in the middle of the field, where it lies to dry and acquire that brittleness which is its peculiar quality. In course of time the threshing machine comes along; the farmer sacks his wheat and piles it up on the same ground. He has no fear either of rain or dew. He leaves it there till he finds a market, and then ships it by a sloop or barge to the wharf at San Francisco. Frequently he sells it as it stands, piled up on the ground, and the purchaser carts it away. After the first rain the farmer ploughs, not very deeply for the soil is still rich, and then he sits down and prays for rain.

In some of the more early sown districts the land is beginning to suffer from the constant demands upon it. Year after year the plough has turned over its surface, and the unvarying seed wheat sown, so that of late the yield per acre has been gradually lessening. The system of rotation of crops and fallow ploughing has been

neglected, not even deep ploughing has been practised, and the subsoil plough is unknown in California. Lands that in 1859 produced sixty to sixty-five bushels to the acre, now only yield thirty to thirty-five or about one-half.

Another very economical system of farming, which succeeds very well in California, is that called raising a volunteer crop. This is especially the case with barley. Volunteer crops are those grown from the seed which falls out in harvesting, consequently there is no sowing nor even ploughing in all cases. It is sometimes only harrowed. Barley has been known to volunteer five years in succession and the last crop a good one.

There are two seasons for sowing, known by the name of the early and the late. The early is in November and December, the late from February to April. The most certain crops are those sown early, the largest those sown late. It is all a matter of chance, a species of gambling. The early sower takes advantage of the November rains, and puts in his grain. If copious rains fall in that month and in December, he is all right, he can do without any more rain, indeed, if the wet weather returns in the early spring, he loses, and *vice versâ* the late sower wins. In a wet season the highlands thrive, in a dry season naturally the lowlands.

The next important industry in California is wool, the growth of the trade in which corresponds with the progress of California, and which, from a comparatively limited field of operations, has become highly important. The native Californian sheep were of a degenerate breed, and produced only a coarse blanket and carpet wool. The flocks were chiefly confined to the southern counties, such as Santa Barbara, Los Angeles, and St. Luis Obispo. After the discovery of gold and the admission of California into the Union, fine breeds of American sheep

were brought from the other side of the Rocky Mountains, and crossed with the native sheep. Later still, superior breeds of Merino and others came by steamer, so that by dint of crossing and weeding, the quality of the present sheep is very fair, though not equal to that either of Australia or New Zealand. The first export of California wool was made in 1853-54 and amounted to 175,000 lbs., value 14,000 dollars.

In 1855 the exports were	360,000	lbs.	value	$	36,000
For 1856 „ „	600,000	„	„		80,500
For 1857 „ „	1,100,000	„	„		165,000
And so on until in 1869 „ „	13,747,000	„	„		2,370,165
And 1870 „ „	19,237,871	„	„		3,655,000

The exports for the first half of 1871, 12,575,924 lbs. value $3,772,777.

From the above it will be seen how rapid has been the progress in this commodity. It will be noticed likewise that although the amount exported for the first six months of the year is but two-thirds of the whole of last year's exports, yet its value is greater. This is owing to the rapid rise in the price of this staple commodity. Now, taking the fleece of wool at four pounds, which is the average weight, it will be seen that there are more than three million sheep in the state. This, however, is below the mark, as many sheep are not sheared until the autumn, and some not sheared at all. Upon the whole I should think that the number of head of sheep in California exceeds four millions. Notwithstanding the occasional dry seasons, when the sheep perish by thousands, all those who have taken good care of their flocks have prospered, and many have grown wealthy.

The largest flocks of sheep are in the southern part of the state, and the best quality of wool comes from the north. This is natural as the climate is colder, and I find the Oregon wool very superior to the Californian.

Klamath, Humboldt, Trinity, Tehama, Mendocino, and Yuba counties, where no sheep formerly ranged, send the best wool; the reason for this being obvious, for their flocks came over the mountains direct from the east, and have never intermingled with the inferior California sheep. The quantity received so far, however, from these counties is small, whilst, as an evidence of the wealth in flocks south, some twenty growers in San Juan average 20,000 dollars each a year from their wool alone, without reckoning their increase in lambs which is very great. The dry season has affected the wool this year, and the staple is short. Fleeces which, as I before said, average in ordinary years four pounds in weight, only average three pounds this year. They are freer from burrs than usual, however.

The different woollen mills of California consume rather more than five million pounds of wool annually. One of them, and the largest, uses two-thirds of the whole. It is a joint-stock company under the title of the Mission and Pacific Woollen Mills. They make the most beautiful blankets I ever saw, and gained the gold medal at the Paris Industrial Exhibition. It seems strange that the first prize for blankets should be won at this out of the way place.

Formerly all the wool was sent by sailing vessels round Cape Horn to New York and England. When the Pacific Mail Steamship Company increased their carrying facilities, at the same time reducing their rates of freight, it was sent by way of the Isthmus of Panama. To-day the greater part, indeed almost all the wool goes by the Central Pacific Railroad. The freight is two and a half cents currency by rail, two cents gold by steamer, and one cent per sailing vessel. The rail is preferred on account of celerity and delivery of the merchandise in better condition.

WINE.

THE next important industry in California is the manufacture of wine. In fact it has been said that the productions of California, irrespective of her gold, are the three Ws— wheat, wool, and wine.

In the early days of California, which the Newcomes call the fossil age, grapes were the golden fruits of the vineyards. To-day, the fermented juice is the grand desideratum. When grapes were a dollar a bunch, nobody thought of making wine, save and except for home consumption. When grapes began to rot on the ground for want of buyers, on account of the tons that poured into the market, then growers turned their attention to wine-making.

I don't think that I have hitherto sufficiently insisted on the fact, that it was the southern part of California which was the only settled and civilised portion before the discovery of gold. Beyond the bay of San Francisco, south to Los Angeles and San Diego, nothing was known. The great valley of the Sacramento was inhabited by Indians, elk, bears, wolves, antelope, and smaller game and vermin, whilst at Monterey, Santa Barbara, San Gabriel, and Los Angeles in the south, the old Missions, with their broad and fertile lands cultivated by baptized Indians, afforded a comfortable home to the Spanish Padres. San Rafael, the farthest ecclesiastical establishment north, is only twenty miles from San Francisco, although there are monastic buildings at Sonoma, a few miles further. But the seat of all the power lay

south. Monterey was the capital, and the beautiful gardens where fig trees and olives abounded were only to be found at the Missions. Here too were the vineyards. The consequence was that in the beginning all the grapes came from Los Angeles as the port, and the variety of grape was known as the Mission grape. It has been also called the Malaga grape, but from researches I am inclined to think that this is a misnomer. The old Fathers came from Catalonia; naturally the vines that they would order to be sent to them by the ship that arrived biennially from Europe, would be those which they knew at home, and the grape that is called the Mission grape is most probably the Catalan, which makes the Beni Carlo wine. The difference of soil and climate has somewhat changed the character of the grape, but as the cuttings had to undergo a long voyage, only the most hardy would survive, and they have produced a vine of wondrous strength and bearing. There are vines in these Missions that are eighty years old, and show no signs of decreasing vigour.

Vineyards paying so well, of course every farmer had one. But as it takes four years before the young vine is strong enough to bear fruit, so in the meantime the old vineyards, as I said before, coined money. At length from north, east, south, and west, the grapes began to pour into San Francisco, and then growers began to think of turning their surplusage into wine.

Then arose the fallacy (Noah derived), that he who could plant the vine and gather the grapes, could also tread the winepress and manufacture the wine; not only manufacture, but bring it to market. In other words, the happy, contented, not over-wealthy husbandman of Los Angeles found himself transformed, by the force of circumstances, into grower, manufacturer, and merchant, with a limited capital and still more limited knowledge,

either of manipulation or business. The good man tasted his grapes as they ripened in the genial sun of the south, pronounced them very good, forthwith bought what he considered the necessary utensils, and made his wine. A tanner makes a bad shoemaker, and a miller isn't fit to be a baker, and so he found out that a vine-grower is not a wine merchant or manufacturer. The consequence of this conglomeration of pursuits, joined to want of skill, caused the early wines of California to be crude, alcoholic, and unpalatable. The planter-manufacturer waited a reasonable time until, as he thought, fermentation had done its work, and then bunged up his wine in casks and placed it either in a cellar where a thorough draught passed through, or in a wooden shed where it was roasted all day and frozen all night. If the wine didn't go sour, or fermentation didn't recommence, or the whole affair didn't turn to a ropey insipidity, the fortunate vintner was left with a liquid that 'must be pure,' for it was made from the pure juice of the grape, and nothing added but what, as I have stated above, was crude, alcoholic, and unpalatable.

Vines will grow anywhere in California, but certain species thrive under certain conditions better than others, and this question should be carefully attended to. The old Mission grape was grateful to the taste, sweet, and saccharine, planted as it was on the low rich bottom lands of the southern valleys. Take the same vine to the foothills of the Sierras, and plant it in a calcareous, gravelly, soil, where it struggles for existence among rocks and stones, and you have a grape not so good to eat, but one that makes a far better wine than its pampered brother of the lowlands. The latter makes a stronger spirit, but the other has drawn its life from the mountain air and stony soil, and is not of the earth, earthy. Now the grape is indigenous in California. It is to be found growing like

a bramble on the banks of the Sacramento. It is to be found most pleasantly in the ravines of the foot-hills, generally over some pool formed by the trickling of a mountain brook. It twines among the lower branches of the trees, and over the bushes that surround the water. If undisturbed, hundreds of quail congregate there at sunset. The grape is small and acrid, yet mixed with foreign grapes in certain proportions makes an excellent wine, somewhat resembling the wine of the Rhone in flavour.

The early wines of California were all falsified being mixed with strong foreign wines. The Los Angeles wine was not good enough to send out in its natural state, so the dealers doctored it, and these compounds went by the name of California wine, bringing no credit to the country. Meanwhile it was found that the mining towns in the mountains grew better grapes than the old Missions, and that the valleys of the coast range made better wine than any. For some enterprising landowners, prominent among whom was a Hungarian named Colonel Harasthy, had gone to Europe and returned with cuttings of vine from the finest vineyards of the old world—cuttings from the district of the Medoc, from Burgundy, from the Rhine, the Moselle, as well as from his own country. And they throve wonderfully. His vineyards are in the beautiful vale of Sonoma, Sonoma meaning in the Indian tongue 'Moon Valley,' the valley where the moon loves to linger. To-day, the relative proportions of the product of the four great wine-growing districts, viz. Sonoma Valley, Napa Valley, Los Angeles, and Eldorado, may be classed by the following figures—41, 38, 14, 11. There is wine made now at the 'Poza caliente' (hot spring) vineyard, which, if kept long enough, will equal good wines of the Rhone. In fact some foreigners were deceived when they tasted it, and pronounced it an imported artiele.

The amount of wine manufactured last year was six millions of gallons. The crop this year will be large, for the drought so fatal to grain has been beneficial to the vineyards. It is estimated that at least eight millions of gallons will be made in 1871, which at the low average price of thirty cents a gallon, will add 2,400,000 dollars to the capital of the country. About one-twentieth part of the wine has hitherto been distilled into brandy, this year it is highly probable that one-tenth will be distilled, especially if the price keeps low, as the number of distilleries is increasing in the state, and brandy is less expensive to store, and more easily taken care of than wine. As far as I have had experience, the brandy does not compare favourably with that of France.

SERICULTURE, BEET SUGAR, OLIVES, ETC.

Among the minor branches of industry at present in California, but one that is likely to become of considerable importance, is silkworm raising. For some years past, owing to a disease, the nature of which has puzzled scientific men, and the cure for which has baffled the most experienced sericulturists, the worm in Italy has been gradually dying out, and the Italian growers have been scouring the whole world in search of new and healthy eggs. They are to be found in Florida, in Louisiana, Peru, Japan, China, taking California *en route* for those last two countries.

A Frenchman, of the name of Prevost, was the first to draw attention to the practicability of rearing the silkworm in California. He had a large nursery garden, near San José, and planted some mulberry trees. His efforts were much aided by Mr. Hentsch, a banker of San Francisco, who sent to France for the best eggs that could be procured. Mr. Prevost, though an earnest enthusiast, yet was not practically enough acquainted with the subject. He grew the mulberry, he hatched his silkworms, he produced his cocoons, but the quality of the silk was not good, and his eggs were unproductive. However, he had proved the possibility, and the state offered a premium of $300 for every thousand mulberry-trees of a certain age, and a like premium for every hundred thousand cocoons. The consequence was, that every farmer planted mulberry-trees, regardless of soil, situation, or quality. The state premium was the price

of a good crop, and so the state found out, for mulberry-trees poured in, or rather claims for premiums multiplied so fast, that the Government was obliged to cry enough and rescind its enactment. Mulberry-trees had been sown like peas, and the greater number to the acre the greater the farmer's profit. The favourite plant was the *Morus multicaulis*, which is of very rapid growth, and throws out immense leaves. This species, when planted in wet land, as many were in the Sacramento Valley, shot up like Jonah's gourd, but the leaves were nothing but water, and the silkworm, which is a greedy feeder, literally died of dropsy. Mr. Hoag, of Sacramento, planted upwards of a million trees of this *Multicaulis*, but has never been successful in rearing the worm. The two species of mulberry best adapted for sericulture are the *Morus alba* and the *Morus moretti*, both of them originally from China, but now almost indigenous in Italy through centuries of cultivation. As I said, not only in early moruculture were the sites and species wrongly chosen, but the trees were planted so closely together that when they grew up neither light nor air could penetrate between their thickly-interlaced branches, and sunshine is essential to the leaf; the consequence was that the state became charged with inefficient cocooneries and unhealthy worms. Even had the *Multicaulis* been the best species, so great was the hurry of the growers to obtain the premium, that they fed their worms on leaves that were picked from too young trees, so that they produced weak, soft cocoons. In 1860, an unknown grower introduced certain eggs from Montauban in France, which for a time gave excellent results, but, being badly reared everywhere, the quality has much deteriorated. The cocoon resembled much that which is called Macedonia in Italy, here known by the name of the Yellow California. The California Silk Cultivation Society, whose mulberry

groves and cocoonery are on the line of rail between San Francisco and Sacramento, sold over three millions of eggs to some Italians on their way home from Japan, none of which turned out well. A grower in the south sent a small lot of eggs to Signor Cerruti, the Italian consul of this place, who takes a great interest in sericulture, and to whom I am indebted for valuable information. Mr. Cerruti forwarded them to Turin, but when they arrived it was found that the majority of them had hatched on the voyage, nevertheless, so great was the interest taken in California silkworms, that the remaining eggs were divided among the sericulturists in that city, to be carefully nursed and attended to. By the last accounts they were all thriving well, having passed through their third stage of growth, with only one more to pass through ere arriving at maturity.

Meanwhile the Italians in California had not been idle, and Mr. Larco, a wealthy merchant of San Francisco, has laid out the most perfect establishment for silk-raising in the state. The whole has been under the superintendence of Signor Cerruti, who thoroughly understands the art, as well as of practical workmen imported from Italy. Forty acres of land are devoted to mulberry-trees. The land is beautifully situated in a basin surrounded by the foot-hills of the coast range. The ground was laid out in 1868, and from twelve to sixteen thousand mulberry-trees planted, which will be in their full maturity next year, and twenty thousand more in eighteen months. The species planted were *Morus alba* and *Morus moretti*, with some few varieties from China by way of experiment. None of the trees are nearer one another than sixteen feet, and Mr. Cerruti even advises wider planting, in order to economise the intervening spaces for cereals. For the first year the mulberry-tree requires irrigation, after that the roots, which strike downward, find enough

moisture in the earth. Mr. Larco's cocoonery is all that is excellent. Its capacity is 600,000 silkworms, producing more than two thousand pounds of cocoons, which at the low price of $5 a pound, gives a nice income without counting the increase of eggs, and this only upon forty of Mr. Larco's ranch of 1,200 acres. Although the establishment is only three years old, it has already turned out a quality of silk superior to anything we have yet had in California.

With respect to the disease among the worms in Italy, I learnt that some very interesting experiments have been made by Professor Susanno of Milan, who has determined that it is not the mulberry that affects the worm, but that the disease is latent in the animal itself. Whereupon the Professor has adopted what he calls a 'système cellulaire.' He takes a quantity of eggs, and subjects each one to a careful microscopic examination. Every one that shows the slightest symptom of disease is destroyed, and only those preserved that are to all appearance healthy. As soon as the worm is hatched, the microscope is again brought into play, and the same winnowing process gone through. The selected worms are then separately brought away (cellulaire), and selected cocoons set aside. The female moths thus produced are kept apart, and their eggs noted. Immediately she has done laying she is cut open, and her internal organs carefully examined by the microscope, for it is thence, says Professor Susanno, that the disease emanates. The eggs of those moths only that present a healthy appearance are preserved, and in this manner it is to be hoped that in two years' time the ravages of the silkworm disease may be repaired.

The cultivation of the White or Sugar Beet in California, and its manufacture into sugar, is as yet in its infancy. A company, called 'the Beet Sugar Company,' have established works at Alvarado, and these have been

in operation one season. They have succeeded in obtaining rather more than seven per cent. of sugar from the beets. The yield of beets is about twenty tons (2,000 lbs.) to the acre, giving therefore 2,800 lbs. of sugar to the acre. The company operated upon 3,000 tons last season, which yielded 400,000 lbs. of sugar and 15,000 gallons of molasses. In the coming season the company will work the produce of 400 acres belonging to them, as well as of 200 acres contracted for at $3·50 per ton, delivered at the factory. When the works are not engaged on beets they refine imported raw sugars, so that they are never idle.

The opium poppy is likewise successfully raised in California, but in small quantities.

The olive has always thriven well in the south, and none of the old Missions were without their olive grove. If tradition speaks true, the old Padres were not without their olive branches as well. For the first ten years of the American occupation the groves were neglected. The Mission lands were the subject of litigation, but now attention is directed to the cultivation of this very profitable branch of agriculture.

In Santa Barbara Valley, Messrs. Fernald, Blanchard, and Towle have two thousand olive-trees of six years' growth, which will bring them in from ten to twelve thousand dollars, and the product of the neighbourhood is estimated at a hundred thousand gallons of oil, worth about two dollars a gallon. The tree that makes the best oil bears a small fruit, but the large Spanish olive is the best for eating, though Frenchmen prefer their small round species. The Spanish olive, however, has a higher flavour.

The process of extracting the oil is very simple, the olives being squeezed in a common press, and then strained through hair bags, so that any farmer can manufacture the oil. He has only to let it clarify in earthen or stone vessels.

THE ZOOLOGY OF CALIFORNIA.

BEFORE the occupation of California by the Americans the country abounded with many species of animals, that are now, if not extinct, at least driven to the mountains or the recesses of the forests. In 1849 vast herds of elk roamed over the valleys of the San Joaquim and Sacramento, and venison was as cheap as butcher's meat. To-day not one is to be found in the great basin from Shasta to San Diego, and only occasionally do the hunters come across a solitary specimen in the coast range, north of San Francisco. In the old days the traveller to the mines would see long files of the antelope, or the deer would look out with large wondering eyes from a clump of oaks, but to-day only the trees remain.

The elk is similar to the extinct Irish deer. It is an animal with the body of a horse and the head of a stag. It is about seven feet long by five feet high, and when full grown weighs from eight to twelve hundred pounds. The antlers are very large and handsome, with eight and sometimes nine tines, and young elk are very good eating. The venison of the deer is not so good except under the exceptional case of a fat buck being met with; but in general the meat is lean and tough. Young antelope on the other hand are very delicious, and the animal more elegant than the deer; they move differently also, the deer bucks in bounds, whilst the antelope canters. The antelope is gregarious and follow their leader, whilst the deer move about according to their volition.

In the southern part of the Tulare are flocks of an

animal that may be said to be a cross between the deer and sheep. It is called the mountain sheep, and is exceedingly difficult to get at, living in almost inaccessible places, and being besides exceedingly wild. It is much larger than either a sheep or deer, weighing between three and four hundred pounds, has no wool but only a coarse brown hair. The horns are something like a crescent in shape, and it is affirmed—although I never saw it—that the animal will throw himself from a high precipice, alighting on these horns without suffering the least injury.

But the king of beasts and the pride of California is the grizzly bear (*Ursus horribilis*). It weighs sometimes over two thousand pounds, and one monster that was on exhibition, I was told, weighed fully two thousand five hundred. This beast was nearly five feet high by about eight feet long, and more grey than other smaller ones that I have seen, which inclined more to a brown colour. The head is small in comparison with the body, and the nose is pointed, which together with its small sharp eye gives the animal a look of good-natured cunning. Indeed the grizzly cannot be ranked among the savage animals, for it never attacks man unless wounded, or when a mother with cubs. The mighty strength of the grizzly bear lies in its paws, great massive limbs ending with almost a hand, with long claws that look like the teeth of an iron rake. Woe betide the man who gets a pat with one of these paws, the importance of which to the animal as a food-getter may be evidenced when one comes across the broad hole he has dug in the ground seeking for roots.

Of course the ambition of every Californian sportsman is to kill a grizzly, and that is one of the reasons why this bear, who used to roam within ten miles of San Francisco, is now only to be met with in the mountains,

excepting during severe winters, when the snow lies low, and hunger drives him to prowl around the ranches. It is then that the grizzly becomes carnivorous, his favourite food being pig; but occasionally the hunter, after tracking a wounded deer, will think it prudent to retire when he finds that a grizzly has appropriated his game. As I said, the bear rarely attacks a man, at the same time he can carry a vast quantity of lead. The first shot rarely kills him. The best place to aim at is behind the shoulder. Now suppose a man with a good repeating rifle follows 'bear tracks' into the chapparal or brushwood, which the grizzly chiefly inhabits. It is almost always on the side of a hill. His first endeavour is to get above the bear for a reason you will know shortly; but in case he should come upon him unawares, or see him moving up the hill, stopping every now and then to dig up a root, the temptation is too strong, and he waits till he thinks he sees the shoulder, and then blazes away. There is a fierce not exactly a roar, but what one might call a bear swearing, and then crash he comes through the bushes. It's no use running now, for a grizzly can beat a horse down hill. Up hill his immense weight and unwieldy shape gives man the advantage, that is why it is better to be above him, but he runs and rolls and tumbles down hill at a fearful pace. Now he has arrived in front of the hunter, and rears on his haunches. This is the time to give it him again, just inside of the foreleg. If he knocks him over, all right, if not, pat, and he is down, and the bear begins to mumble him. The best plan is to feign death, when after a time the bear will go away.

Many marvellous stories are told about bear hunts. One of them was recounted me by a gentleman whose veracity I have no reason to doubt. He was riding in the neighbourhood of Santa Barbara, looking after small game, when suddenly he came upon a huge grizzly. The

bear stood still and eyed him, not showing any inclination to move away. His gun was only loaded with wire cartridge and No. 8 shot. He took good aim and fired, breaking the bear's hind leg. The grizzly made great efforts to get at him, dragging itself by its forelegs. My narrator drew his revolver, which they always carry with them in the country and fired three shots in the region of the heart before he killed him. He has the skin as a trophy. Another story was told me by an Irish gentleman named Tobin, whom I met in company with some friends. He said that he was with a large party hunting bear in the mountains near Mendocino when, feeling tired, he returned to camp, laid down his rifle and fell asleep. He was awakened by a noise, and looking up saw an immense grizzly sitting on his rifle and staring at him with all his eyes. He lay perfectly still for a minute, mentally revolving his peculiar position, and then, quick as lightning, sprang to his feet, giving an Indian war whoop. He had two reasons for this; some of the party might be in the neighbourhood and would come to his rescue, and of course the other was to frighten the bear. It had that effect; the bear jumped back a few paces, he seized his rifle, shot it through the heart, and then fainted away. When he came to his senses the bear was nowhere to be seen, but there were tracks into the bushes. One of the gentlemen present whispered to me that he was told by Judge H., who was of the party, that when they came back they found Mr. Tobin half asleep, and a good hole made in a demijohn of whiskey.

But the grizzly will rank with the dodo some of these early days.

There are also the brown bear and the cinnamon bear, both fiercer though not so powerful as the grizzly. They are also both climbers, and live in the forests, whilst the grizzly seldom climbs, and prefers to live in the chapparal.

The animal next in size is vulgarly called the Californian lion, being in reality a puma. It is an ugly, skulking, dirty-brown brute, and kills sheep and deer. There are wolves, foxes, red, grey, and common. The red fox's skin is very soft and handsome.

An animal allied to the fox and the dog, called coyote, was very numerous, and indeed is still often to be met with in the interior. It is the most hungry, cadaverous, unhappy, and predatory animal in California. It is also the most hunted, and trapped, and tortured. The coyotes hunt in flocks during the night-time. Their cry is somewhat similar to that of a pack of hounds only with a tone of starving misery. There is something very melancholy to hear them in the still midnight when one is camping out in the woods. At first there is one sharp impatient hunger-drawn bark, followed by a whimpering, and then a chorus of prolonged howls, growing fainter and fainter as the pack passes up some ravine. One feels almost sad to hear this cry drawn forth by a gnawing craving want of food. I have seen many coyotes killed, and never found one that was not a mass of skin and bone. They are awful thieves however, and will hide all day in a hen-roost if there are no dogs about. There is also a species of wild cat, very fierce, larger than the domestic animal and with a short tail, that is very troublesome about a farmyard, especially as dogs are very shy of them. The only way is to train the dogs to tree them, and then bring them down with a shot gun.

California is not so rich in fur-bearing animals as the countries lying more north; still there is some peltry yet left. Beaver are getting scarcer every year, not that they are trapped as they were some half century back, but they have receded before civilisation. A few years ago their marks were visible on the trees that lined the Sacramento and Feather rivers, but they have gone away

perhaps to the head waters of these rivers, or into the tule marshes where man is now preparing to follow them. The California beaver always was a degenerate scion of the family, contented to live in a hole on the bank of a river, and not build a city like his forefathers.

But the sea-otter still exists, though the great value of its skin causes it to be cruelly hunted. The finest skins are worth from eighty to a hundred dollars a-piece, and the old Hudson's Bay Company used to measure them on gun-barrels, and give the Indians who brought them a Birmingham musket in exchange which cost about ten or twelve shillings. The fur is beautiful in colour, and softness; it can be stroked either way, and the rich 'sable-grizzled' is the favourite tint; the darker the better. The sea-otter is extraordinary in its habits, and flies in the face of custom. It swims on its back, sleeps on its back, has forepaws like a quadruped, yet never comes on shore.

At Monterey the sea-otter is still hunted, but along the coast, as far as the Columbia river, it is rarely to be found. The land-otter formerly abounded in the large rivers and lakes, and is very similar to the English variety. The racoon is very common, and is frequently domesticated, more as a pet than for any use that can be made of it. Rats abound everywhere, but the large brown rat predominates. They come out of the ships. I saw one the half of whose body was white and the upper half brown. There are all sorts of mice, from the delicate field mouse to the round hump-backed cupboard depredator.

The squirrel family is largely represented, and most heartily cursed by the farmer. There is a very large, handsome, grey squirrel, whose tail is one-third larger than its body, that lives up in the pine trees. He is harmless, but the ground squirrels burrow in the

ground in colonies of thousands, and eat everything that is grown; they have able assistants in the gophers—half rat, half squirrel—which burrow, and only eat the roots of grain or plants, so that the farmer or planter only knows that the underground enemy has been at work when the plant withers. These gophers have pouches on each side of their cheeks. Like all mischievous things, they, as well as the ground squirrels, breed like rabbits, and some ranches have been deserted on account of their ravages. A fierce war is raged against them, and a premium paid for their skins, which has had the effect of thinning them a little. One smart Yankee farmer, whose place was infested with ground squirrels, circulated a notice in his neighbourhood to the effect, that the 'California Glove Factory' would give a certain price for squirrel skins. All the boys and unemployed men turned out, and hunted and dug out and trapped the vermin until the Glove Factory was obliged to publish an advertisement disclaiming any idea or even possibility of making gloves out of squirrel skins, more especially as the majority sent to them were riddled with small shot.

I have already mentioned the large hare or jackass-rabbit as it is called. Its colour is darker on the back than the English hare, and it has not so much meat on the back as that. It is from twenty to twenty-five inches long. There is another species, equally large, which is perfectly white in winter, and of a light yellowish grey with white belly in summer. There is likewise a little bit of a rabbit that is never longer than a foot, and is found in great numbers about the bushes. It is capital sport shooting them, but it takes a very good shot as they are as quick as squirrels. They make an excellent stew, however.

Of birds there are the common golden eagle, which is to be found all over the continent, and the bald eagle. Then

there is the vulture, which is an enormous bird, measuring nine and even ten feet across the wings. There are many varieties of hawks, from the fish-hawk down to the small sparrow-hawk. Of owls there are nine species, from the great staring brown owl to the little dwarf owl that lives in the hole of the ground squirrel, sometimes with a rattlesnake for companion. There is a strange species of woodpecker here called by the Spaniards *carpintero.* It bores holes in the soft bark of the pine trees with geometrical precision, and therein deposits an acorn, the bark in its growth slightly covers the acorn, and encloses it so firmly as to render it impossible to pull it out. This is the winter supply for the bird and for the squirrels too, who run up and steal them. It has a strange sound among the woods in autumn to hear these birds tapping in all directions, and the noise of these carpenters is the only thing heard in the forest.

There are no real song-birds, such as we in England call songsters, in California. In the spring some linnets get up a few joy-notes, but there is nothing like our early lark, or thrush, or even robin. There is a mocking-bird in that state, but it even is a bad imitation of his Mexican brother. The consequence of this absence of song-birds is, that the bird-fanciers abound in San Francisco, and one sees shops full of canaries and Australian mocking-birds, and other importations. Canaries sell from three to five dollars each. Some very pretty humming-birds, but the most common wears a humble brown suit. The sandhill crane is a beautiful bird, pure white, and shaped like a flamingo. This species lives in large flocks, chiefly on the shallow side of the bend of a river, they are very shy birds. The two species of quail, the mountain and common, are both very elegantly plumed. The mountain quail is as large as a small partridge, which it much resembles, with a

black head surmounted with a plume of two feathers three inches long. The breast is mottled like that of a partridge, but across the breast is a deep horse-shoe shaped mark of the colour of iron mould. It looks like a brand. The common or valley quail is like the mountain only smaller. They are always called quail in California, but I should rather call them partridges. The meat is like that of the European partridge, but more dry. There are three or four species of grouse, but they are finer and more abundant in British Columbia. There are ducks innumerable. Mallard, widgeon, teal, spoonbill, canvass back, water hen, and geese from the small white to the great grey hunker. Wild swans are occasionally seen, and bittern, herons, and the grey plover. Snipe shooting used to be very good in the marshes in the neighbourhood of San Francisco, but civilisation has driven away the wandering bird. There is also a large curlew, which is sold in the markets for woodcock. Some rocky islands named the Farralones, off the coast, are frequented by swarms of murres or boobies, and once a year an expedition is fitted out at San Francisco for the purpose of taking their eggs. The egg hunters rush on shore, drive away the gulls and murres, and gather all the eggs they can. For the next week the markets are full of baskets of these large, green, ugly, spotted eggs, which are sold cheap, as they are strong and only fit to make an omelet of where garlic is liberally used.

The fish of California, as a general rule, are inferior to those either of Europe or of the North Pacific. There is neither mackerel, sole, turbot, nor whiting, but in return there is the pompouneau, one of the most delicious fish I ever tasted. It is of the shape and size of a small flounder, as firm as a sole, and more delicate in flavour than a red mullet. Formerly these fish sold for ten shillings a-piece in San Francisco, to-day they are

about sixpence to ninepence. There are eight different sorts of salmon, but only one, the silver-salmon, can be called good eating. The sturgeon is very common, and is chiefly eaten by the Chinese. There is likewise a manufactory of caviare in San Francisco. The great supply to the San Francisco Billingsgate, however, is called by the generic name of rock fish, embracing the great mullet, a sort of garnet, and red staring fish with enormously large heads and mouths in proportion to their body. The bass is also plentiful, but I must not forget the sardine, which is as large as a small herring, and delicious eating. The herring is soft and inferior. There is a species of viviparous fish which holds its young perfectly formed in an abdominal pouch.

Next to the flea the most common insect in California is the mosquito, as visitors to the Yosemité will have experienced. People emerge from the valley like small-pox patients, and the dainty gnat prefers the tenderest skin. The only venomous insects are the scorpion, centipede, and tarantula, or ground-spider. There are plenty of water and land snakes, but none are dangerous excepting the rattlesnake already mentioned. On the whole, California is not rich in her zoology.

THE FLORA OF CALIFORNIA.

THAT which I said with respect to the fauna of that state is still more applicable to its flora. With the exception of varieties of pine and a large bay-tree, called the Californian laurel, California has nothing to boast of in the way of forest trees. Of the pines, the first of course is the *Sequoia gigantea*, or big trees, already described, and the red wood which, as I have before said, is surmised to be the same species growing under less favourable circumstances. Then there is the magnificent Douglas pine, the sugar pine, the white pine, &c., all good timber trees. There are also varieties of cedars, beautiful wild-looking trees of no great value. There is a tree, called the Monterey cypress, which has been largely imported from the south of California to adorn the gardens and cemeteries of San Francisco, although it is not so handsome as many other ornamental trees. As for the oaks, they are only fit for shade and firewood. The white oak has long spreading branches, and bears very large acorns, but it is rare to find a sound tree, and the timber is worthless. The black or evergreen oak is nearly as large, not so handsome, and equally useless. The horse chesnut hardly attains to the dignity of a tree. Its blossoms are handsome, and the nuts large. The madrona is an elegant tree, swaying about on its long, thin, red-barked stem, like a tree that had overgrown itself. I have mentioned wild grapes. There are delicious little wild-strawberries, like the English hautboys. They used to be numerous in the hills around San Fran-

cisco, and still abound a few miles down the coast. They lose their flavour when cultivated. The blackberries are very large; and the wild gooseberry insignificant. A very large white raspberry grows wild in Oregon, but it has little flavour.

The wild flowers of California are more remarkable for their abundance than for their variety. Acres upon acres will be seen covered with one species. There are the flaunting escholtzia, the gentle blue nemophila, which sometimes makes a plain look like the reflection of the sky, large patches of sunflower, a brushwood of the blue ceonothus, like our English privet, there are asclepias, and euphorbias, and the prickly pear, and the evening primrose, and lupins innumerable, from the fragrant yellow to the bright-eyed dwarf, with blue and white blossoms. The columbine abounds, as likewise many species of ferns, especially the graceful adiantum. But it is in the mountains that the pride of California flowers grow, for there the great lilies cover the ground for miles, and the white azalia snows itself in all directions. The large lily of the Sierra Nevada is somewhat similar to the Japanese lily, and is equally fragrant. In the foot-hills is found a remarkably elegant species of lily, of a pale crimson colour and shaped somewhat like a snowdrop. There is also a rhododendron in the mountains, but all attempts to rear it in San Francisco have failed. Violets are common, and a curious species of fraxilla. The white forget-me-not is everywhere, but the flower-seeker must beware of the yedra or poison oak. He sees before him a straight wand-like shrub, three or four feet high, with beautiful leaves, sometimes of a bright scarlet, covering its stem. Let him beware of adding that to his collection, or the following day his face may be swollen up so that his eyes are almost closed, and he looks like the winner in a prize, whilst acute pains and swellings arise

in the most sensitive parts of the body. Some people can handle the yedra with impunity, whilst others are affected if they only pass to leeward of the plant. It abounds everywhere, and one species is a parasite. The flower is rather pretty, of a light greenish colour. The *Agave Americana* grows wild in the south of California. Yet, as I said before, Nature has not been prodigal in that state, and except in the valleys and mountains, there are no flowers left after June. All is dry and burnt. But no sooner does the welcome rain come, than the latent life springs up in all its green beauty, and before February is over the ground is tinted with the early flowers. The three following months revel in the most luxuriant vegetation, and then the gay flowers leave the scene to recruit for the next season's enjoyment of life.

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